User's Guide: Decision Solutions Model for Water Acquisition

Prepared for

U.S. Fish and Wildlife Service

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User's Guide: Decision Solutions Model for Water Acquisition

The Decision Solutions Model (DSM) is a multi-discipline, decision support model designed to assess water acquisition opportunities using qualitative and quantitative data. It integrates costs, local economic impacts, biological impacts, potential for scientific study, and water transfer implementability into the decision making process. It was created for the U.S. Fish and Wildlife Service (FWS) to assist in making transparent and defensible water acquisition decisions. The model was designed in collaboration with federal and state resource agencies, including the FWS, Anadromous Fish Restoration Program (AFRP) , U.S. Bureau of Reclamation (Reclamation), and California Department of Fish and Game (CDFG), and stakeholders, including the Central Valley Project Water Association, The Bay Institute, Trust for Public Land, and Western Area Power Administration.

Background

The Central Valley Project Improvement Act (CVPIA) amended the management of the Central Valley Project (CVP) to place fish and wildlife protection, restoration, and enhancement on equal priority with agricultural, municipal and industrial (M&I), and hydroelectric generational uses of water. The CVPIA mandates in Section 3406(b)(1) that the Interior at least double the population of anadromous fishes in Central Valley streams and rivers and provide supplemental water to wildlife refuges in California. Section 3406(b)(2) dedicates and mandates the management of 800,000 acre-feet (AF) of CVP water annually for the primary purpose of implementing fish, wildlife, and habitat restoration projects and measures. Section 3406(b)(3) directs the Interior to develop and implement a water acquisition program that helps meet the environmental goals of the CVPIA.

In response to CVPIA mandates, The Water Acquisition Program (WAP), a joint effort between Reclamation and FWS, was created to acquire water supplies for protecting, restoring, and enhancing fish and wildlife populations. The WAP supports the AFRP, which was developed to make all reasonable efforts to double the natural production of anadromous fishes in Central Valley streams and rivers. The drainages included in this effort are Clear, Cow, Cottonwood, Battle, Antelope, Mill, Deer, Big Chico, and Butte creeks; and Feather, Yuba, Bear, Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced rivers. All 18 drainages are modeled in the DSM, however hydrologic modeling and Chinook escapement data are missing for some drainages. Drainages were excluded in ECOSIM (a hydrologic simulation model of all major streams and rivers tributary to the Sacramento-San Joaquin Delta) because they are missing flow targets or do not have good acquisition opportunities. Escapement data are missing because

monitoring programs are not funded and in place for some drainages. Table 1 summarizes any hydrologic modeling or data gaps for each drainage. The following drainages are not limited by missing information: Mill, Deer, and Butte creeks and Feather, Yuba, Mokelumne, Stanislaus, Tuolumne, and Merced rivers. When flow targets are established and escapement monitoring becomes available for a drainage, the new data may be added to the DSM simply by updating the Microsoft Excel input data files.

TABLE 1
Availability of Hydrologic Modeling and Chinook Escapement Data

	ECOSIM		GrandTab Escapement Data	
Drainage	**Modeled**	**Notes**	**Data Available**	**Notes**
Clear Creek	No	Assumed resolved under (b)(2)	Yes	
Cow Creek	Yes		No	No monitoring program on drainage
Cottonwood Creek	No	No established flow targets	No	No monitoring program on drainage
Battle Creek	No	No established flow targets	Yes	
Antelope Creek	Yes		No	No monitoring program on drainage
Mill Creek	Yes		Yes	
Deer Creek	Yes		Yes	
Big Chico Creek	No	No established flow targets	No	No monitoring program on drainage
Butte Creek	Yes		Yes	
Feather River	Yes		Yes	
Yuba River	Yes		Yes	
Bear River	No	No established flow targets; little acquisition potential	No	No monitoring program on drainage
Cosumnes River	No	No established flow targets; little acquisition potential	No	No monitoring program on drainage
Mokelumne River	Yes		Yes	
Calaveras River	No	No established flow targets; little acquisition potential	No	Winter run data is unsubstantiated
Stanislaus River	Yes			
Tuolumne River	Yes			
Merced River	Yes			

The Purpose of the User's Manual

The purpose of the DSM manual is to provide an overview of the water acquisition process and focus on the mechanics of updating data, inputting data, and running and interpreting results from the DSM. Results from the DSM are potential water acquisitions ranked in terms of benefit to anadromous fish. The rankings are based on a set of predetermined policies, criteria, and scoring guidelines. The DSM is represented by a Microsoft Excel workbook (DSM workbook) and a decision science software called Criterium DecisionPlus (CDP) produced by InfoHarvest, Inc. The DSM workbook is used to manage input data and qualitative scores, calculate quantitative scores, and format the scores for export to CDP. The CDP software takes the scores for each alternative from the spreadsheet and applies them to the decision model and produces a ranked list of water acquisition alternatives and a detailed breakdown of how each criterion contributed to an alternative's overall ranking.

The DSM User's Manual details the structure of the DSM, the DSM workbook, and the basics of CDP. For a technical discussion of the DSM, refer to the Decision Science and SMART Technical Memorandum in the appendix of the Final Report. For a more detailed discussion and advanced features of CDP, please refer to the CDP User's Guide Version 3.0.

This manual was developed assuming the user is familiar with Microsoft Windows-based applications, such as Excel, and would be involved in the DSM portion of the water acquisition process. The processes of setting policy priorities, solicitation of willing sellers, and budgetary decisions are assumed to be documented elsewhere. The output from the DSM is only one piece of the information that goes into the decisionmaking process for acquiring water, hence the DSM is considered a decision support tool.

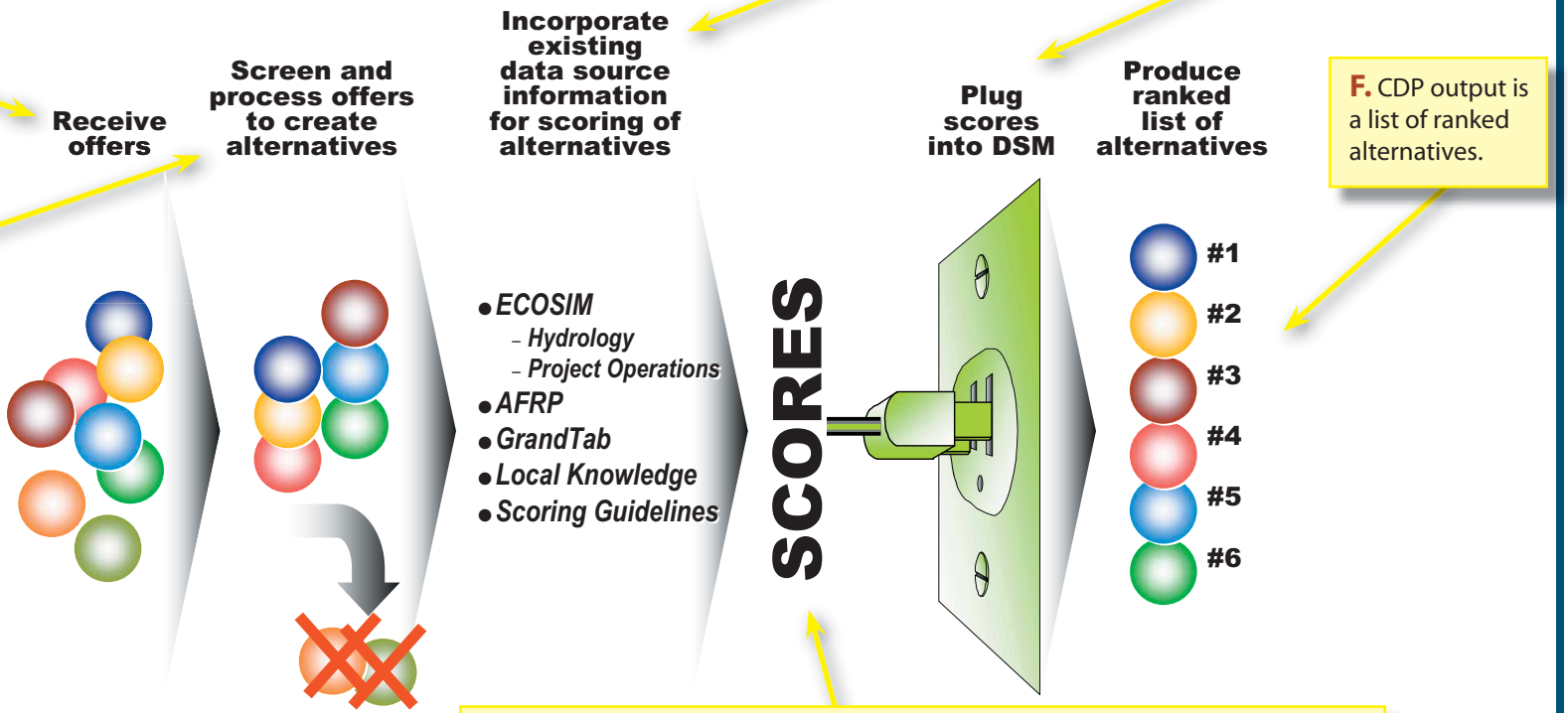
Process to Rank Potential Water Acquisitions Using the DSM

At various points in the calendar or fiscal year, the FWS may solicit water acquisitions from willing sellers. For each round of solicitation, a set of offers will be received by the FWS. Those offers that pass the screening process become water acquisition alternatives that are scored and input into CDP to be ranked.

C. Data from ECOSIM, AFRP guidelines (such as instream target flows), and the DFG's GrandTab database are used in the DSM. Before running the DSM, this data should be verified as the most current or updated as needed. The qualitative scores for the DSM will be assigned by individuals with specific knowledge of the local watershed, fish populations, and institutional and political climates. The user of the DSM may or may not be responsible for convening local experts to score alternatives. However, the DSM user must obtain the scores from the person acting as liaison to the experts or directly from the experts.

E. CDP takes the data from the DSM workbook and produces a ranked list of alternatives based on the scores and the weighted importance of each scoring element. Weights will be discussed on page 4.

A. Offers are received in response to a solicitation for willing sellers.



F. CDP output is a list of ranked alternatives.

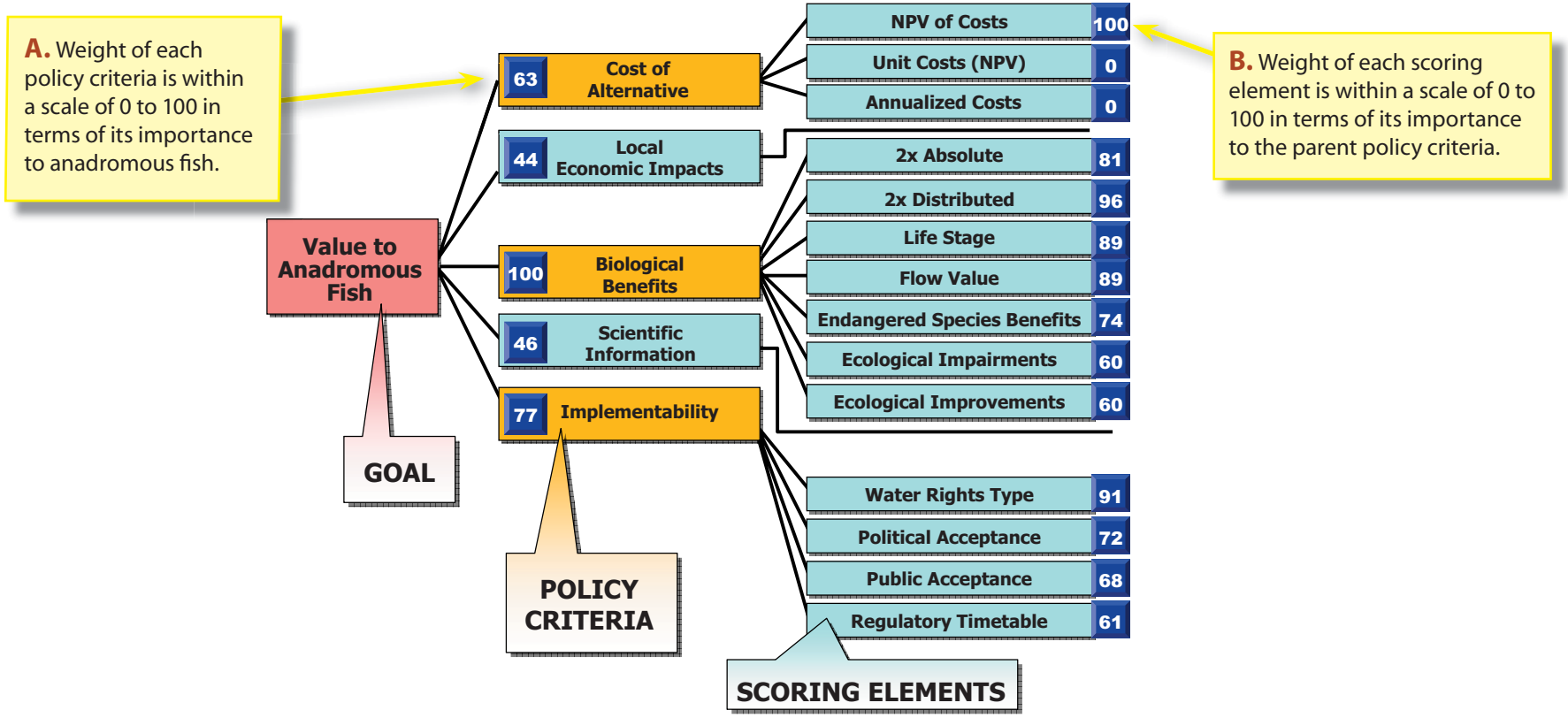
B. The offers are screened for consistency with the solicitation specifications and compatibility with the WAP goals similar to fulfilling grant application requirements. For example, if the solicitation was for spot market purchases in the Deer Creek drainage, then offers for long-term leases or offers in a different drainage are screened out.

D. Information from response to the solicitation, external sources, and experts is input into the DSM workbook. The preprogrammed algorithms in the workbook will calculate quantitative scores such as costs and biological benefits, store the qualitative scores, and format all the scores for export to CDP.

The DSM Structure

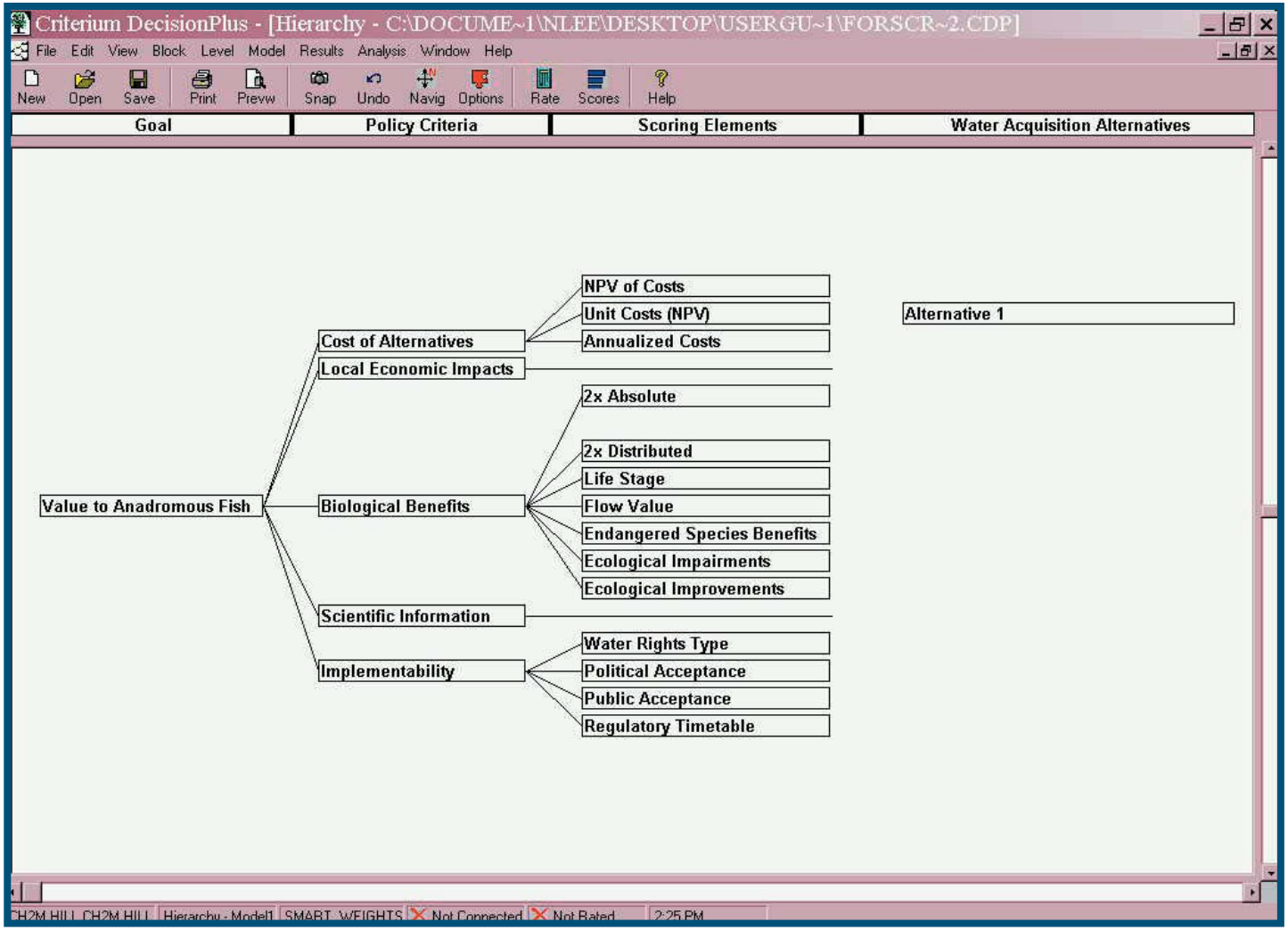
The structure of the DSM was determined through a group process with agency staff and other stakeholders and based on their expertise regarding the policies and factors that affect how valuable characteristics of water acquisitions are to anadromous fish. These weights should not be changed without another group process and substantive justification. For additional information on the weighting process and interpreting the weights, please refer to the FWS Swing Weighting Directions and the Decision Science and SMART Technical Memorandum in the appendix of the Final Report.

The Cost of Alternative, Biological Benefits, and Implementability policy criteria are further decomposed into more detailed factors, called scoring elements. Local Economic Impacts and Scientific Information are not decomposed into scoring elements and are considered both policy criteria and scoring elements. The scoring elements are the factors that are scored with respect to an alternative's benefits to anadromous fish. Note that only one measurement of cost is used at a time. That scoring element would be weighted as 100, while the other two are weighted at zero. If more than one cost measure is used, the scoring element level weighting should be developed by consensus among WAP decisonmakers, economists, and others knowledgeable about how each measure should be interpreted in light of federal budgeting and expenditure policies.



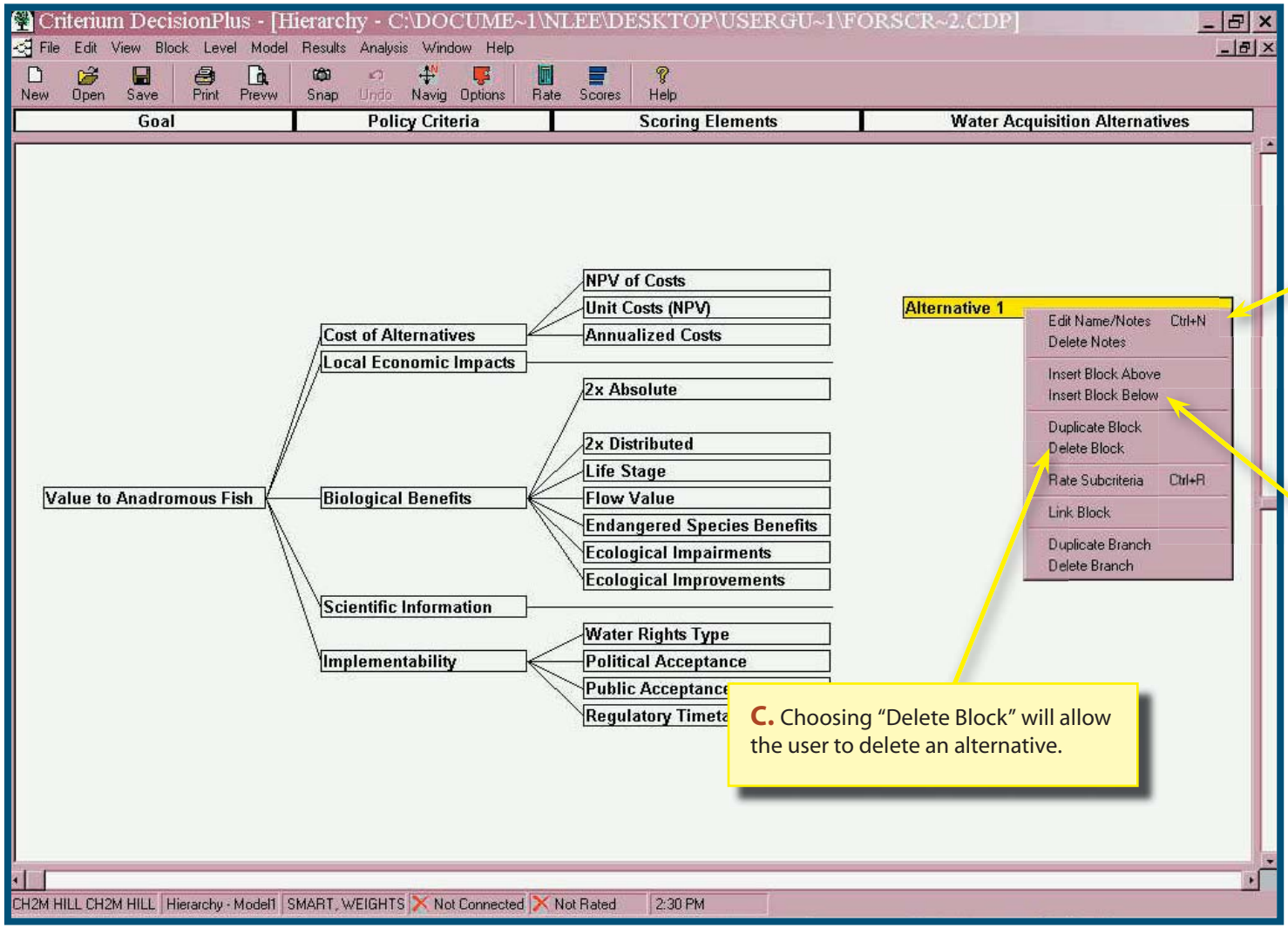
The DSM Base Model in CDP

The basic DSM structure and weights are built into a CDP file named DSM Base Model. The first step in ranking a set of water acquisition alternatives is to launch CDP and represent each alternative under the Water Acquisition Alternatives layer of the model.



Editing Names of Alternatives and Adding New Alternatives

Applying a right mouse click to the Alternative 1 block brings up a menu with useful options.

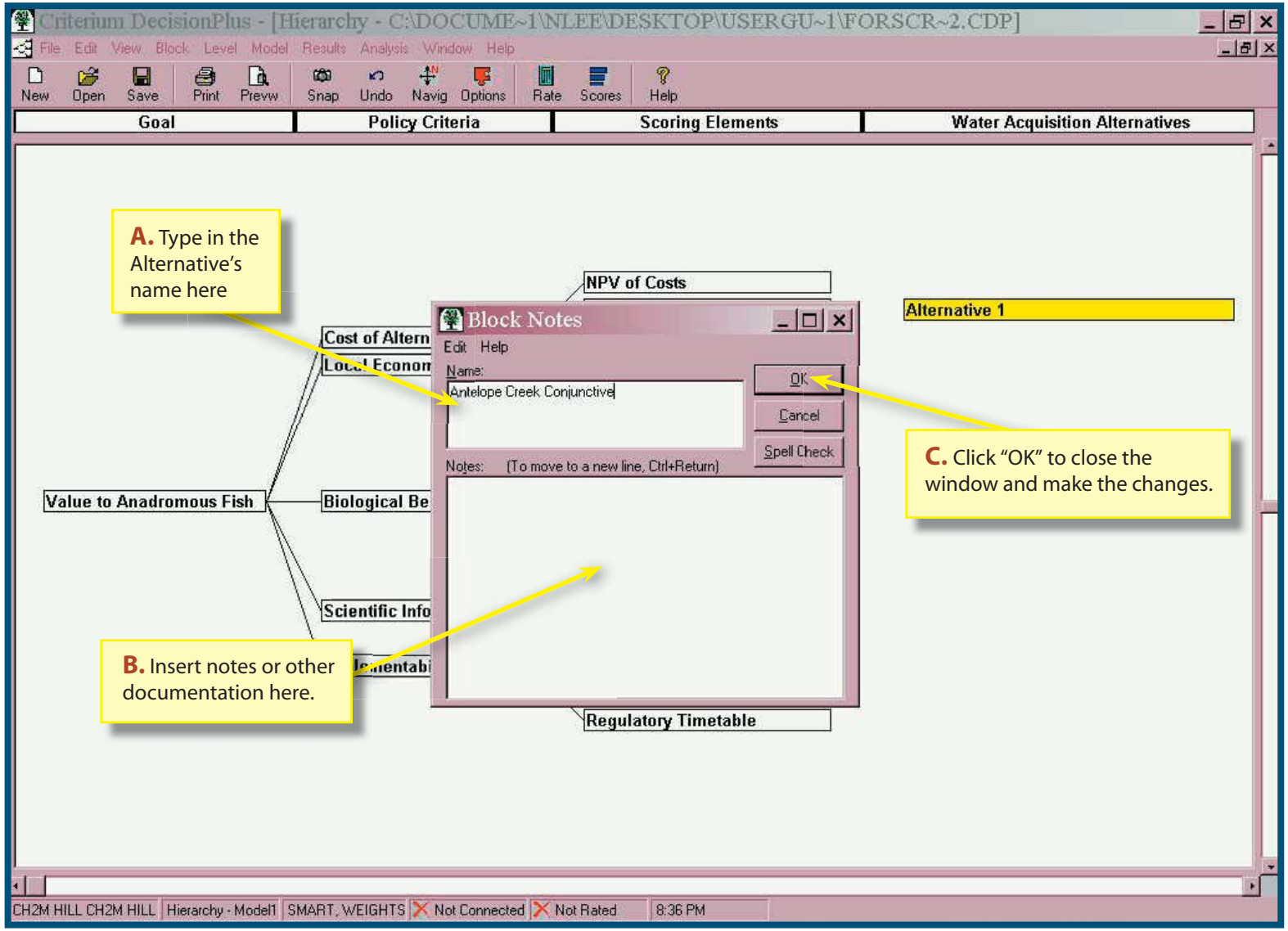


A. Choosing "Edit Names/Notes" allows the user to modify the name of an alternative and add notes or documentation for that alternative.

B. Choosing "Insert Block Below" allows the user to add a new block. While the generic "Name1" is still highlighted the user may type in a more descriptive name for the alternative. Otherwise, right click on the new block and chose the "Edit Names/Notes" option.

C. Choosing "Delete Block" will allow the user to delete an alternative.

Editing Names/Notes of Alternatives

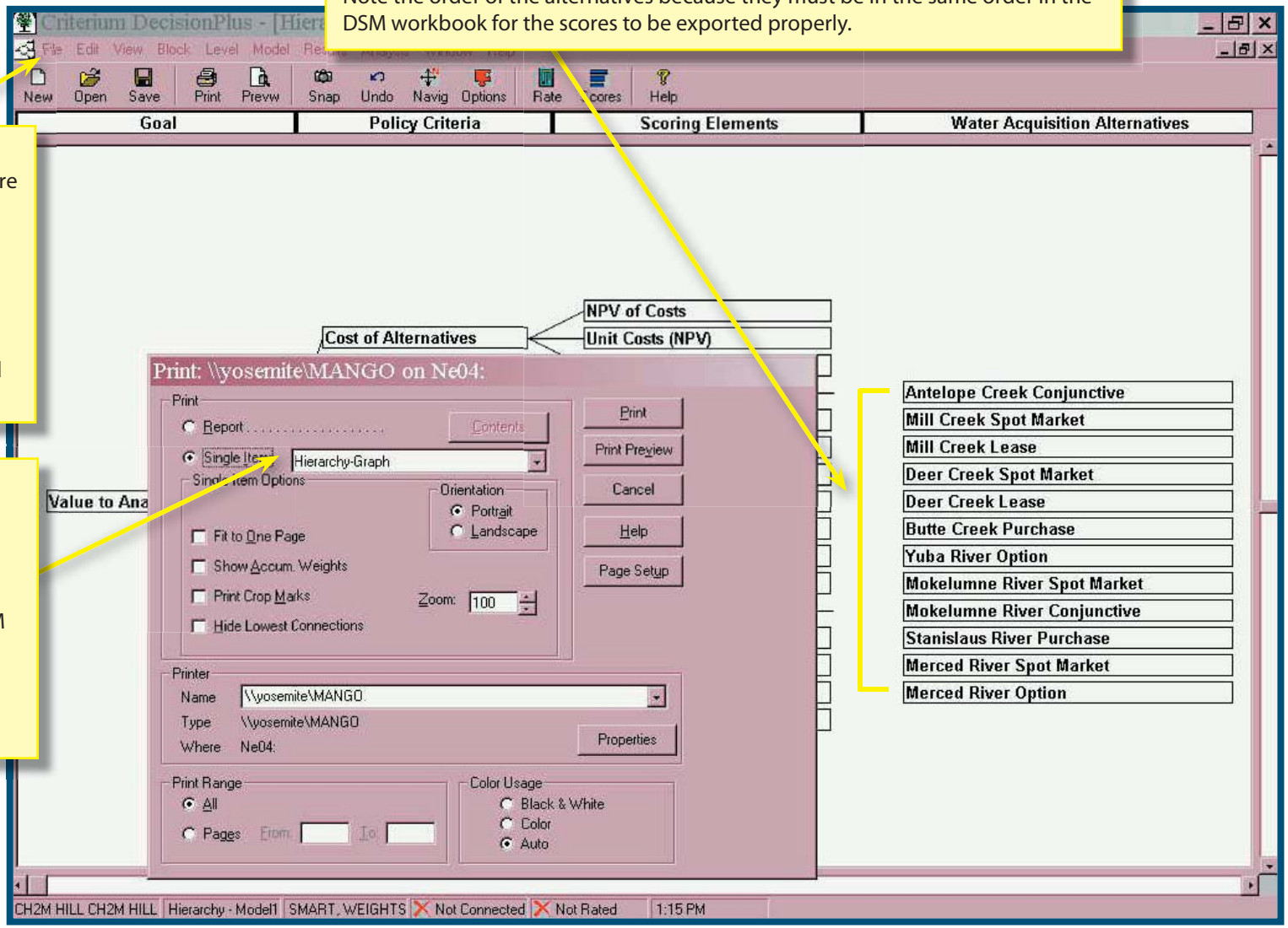


Represent All Alternatives in the DSM

A. Insert and rename an alternative block for each potential water acquisition. Note the order of the alternatives because they must be in the same order in the DSM workbook for the scores to be exported properly.

B. The user can print a copy of the model structure with alternatives (Model Hierarchy) by choosing "File/Print" from the CDP menu bar. This will open a print dialogue box that works much like any Microsoft Windows-based application.

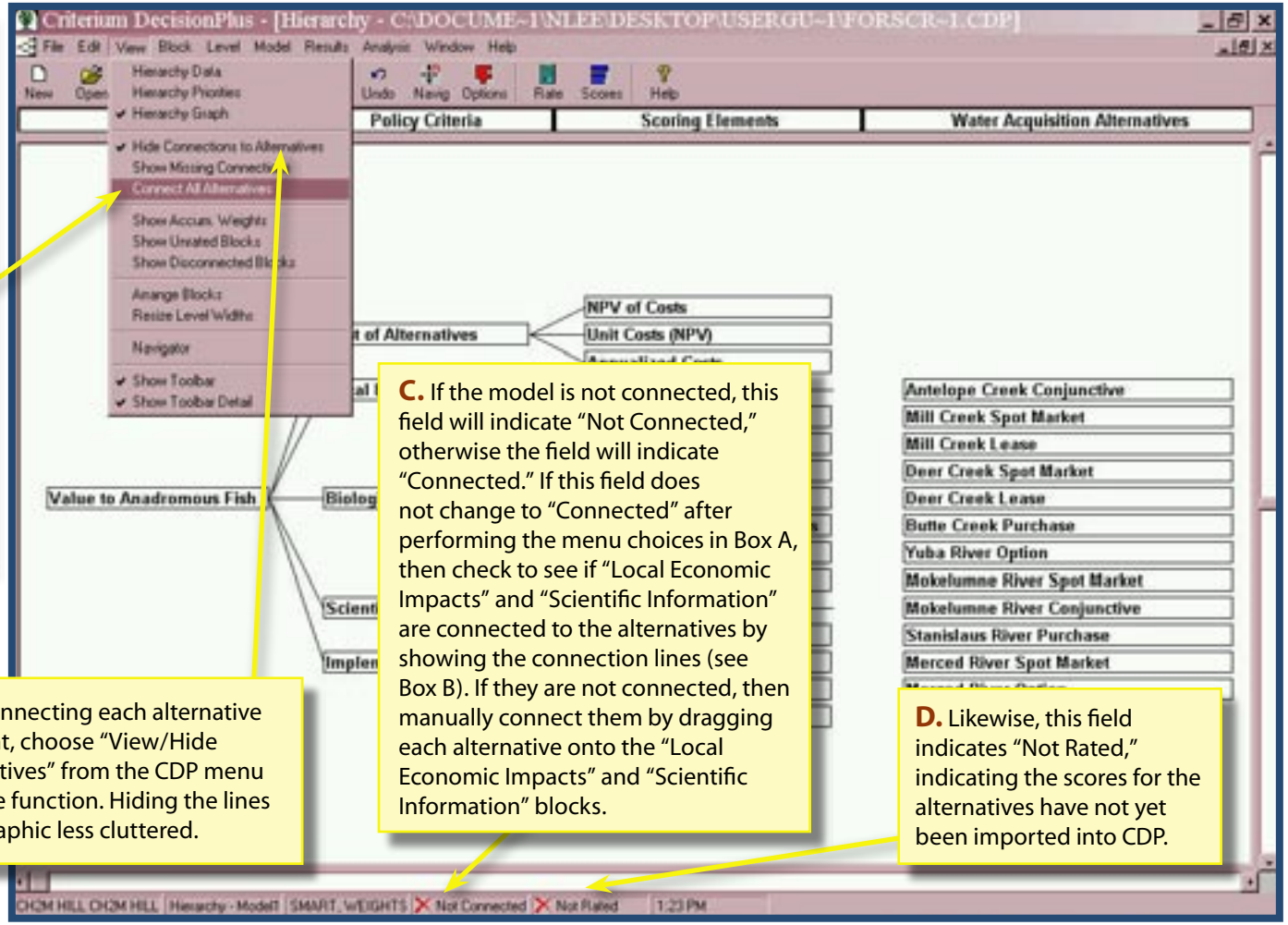
C. Choose "Hierarchy Graph" from the drop down menu to print the model structure and a list of alternatives in the order needed for the DSM workbook. Other CDP features may be printed from this dialogue box as well.



Connect All Alternatives to the Model Structure

Once all the blocks representing the alternatives have been created, they must be connected to the model structure.

A. From the CDP menu bar, choose "View/Connect All Alternatives." This will connect each alternative to the model structure. The user may connect each alternative individually by dragging the alternative block onto each scoring element. If the user must delete a connected alternative, right click on the alternative block and choose "Delete Block."



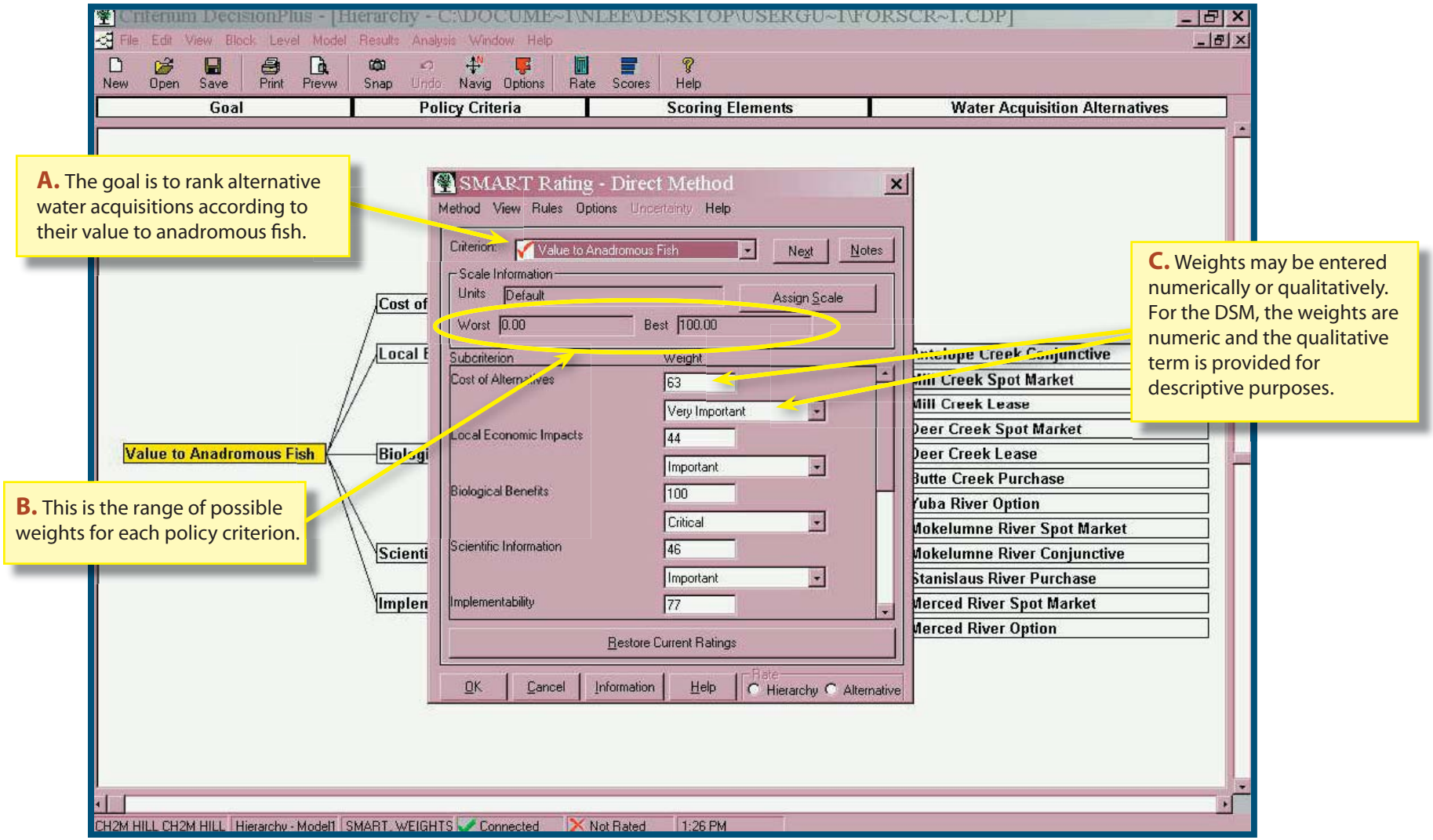
B. To show the lines connecting each alternative to each scoring element, choose "View/Hide Connections to Alternatives" from the CDP menu bar to uncheck the hide function. Hiding the lines keeps the Hierarchy Graphic less cluttered.

C. If the model is not connected, this field will indicate "Not Connected," otherwise the field will indicate "Connected." If this field does not change to "Connected" after performing the menu choices in Box A, then check to see if "Local Economic Impacts" and "Scientific Information" are connected to the alternatives by showing the connection lines (see Box B). If they are not connected, then manually connect them by dragging each alternative onto the "Local Economic Impacts" and "Scientific Information" blocks.

D. Likewise, this field indicates "Not Rated," indicating the scores for the alternatives have not yet been imported into CDP.

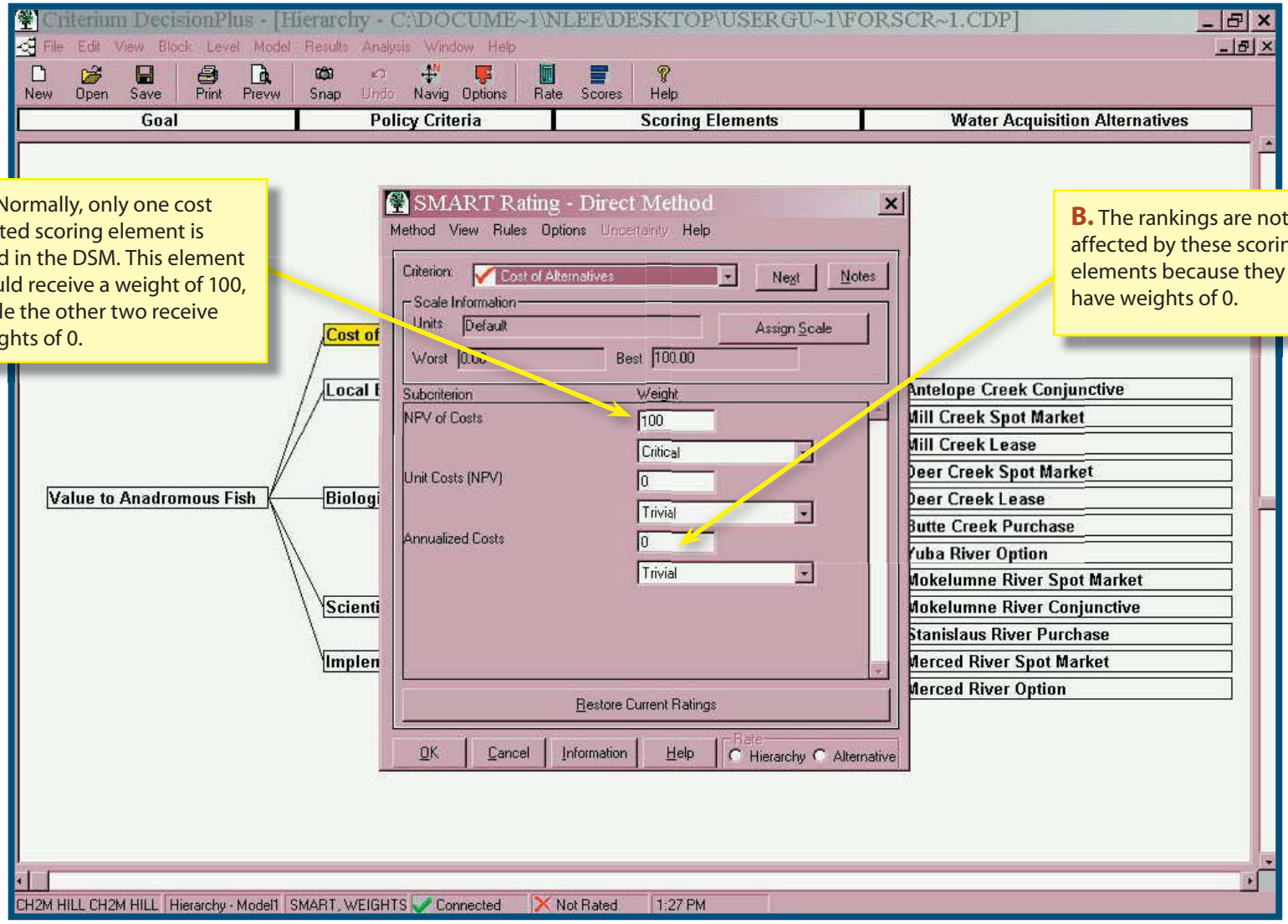
Policy Criteria Weights

The weights for each Policy Criteria are already entered into the DSM. By double clicking on the "Value to Anadromous Fish" block, a window opens with the policy criteria weights. These weights should not be changed without a stakeholder group process to determine new weights based on new information or changes in policy.



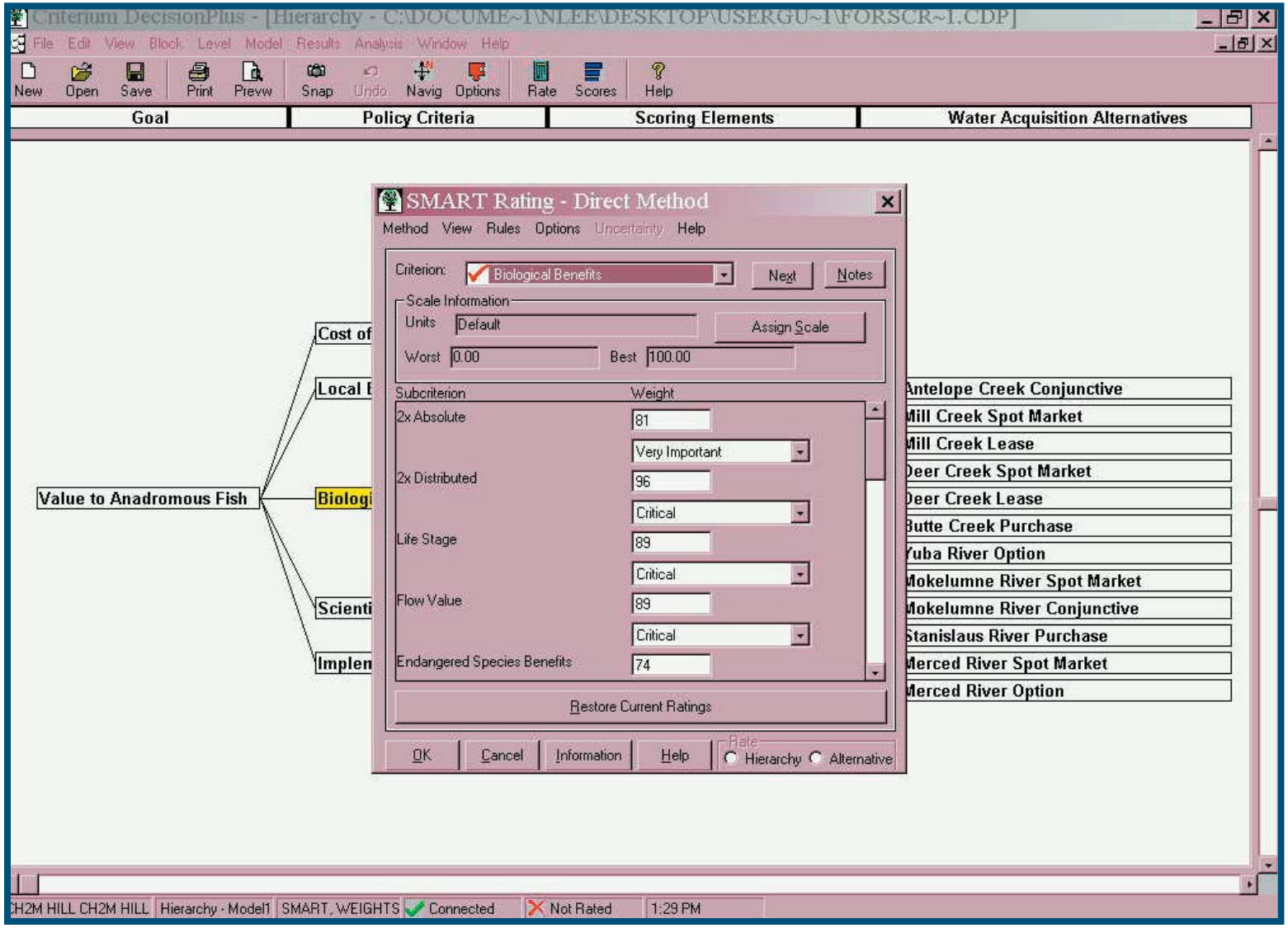
Scoring Elements for Cost of Alternatives

When a policy criterion is a "parent" to scoring elements, the weights of the scoring elements may be found by double clicking on the corresponding policy criterion block. Double clicking on the Cost of Alternative policy criterion block brings up a window with the weights of the scoring elements (a description of each scoring element is provided in Table 2 on page 15).



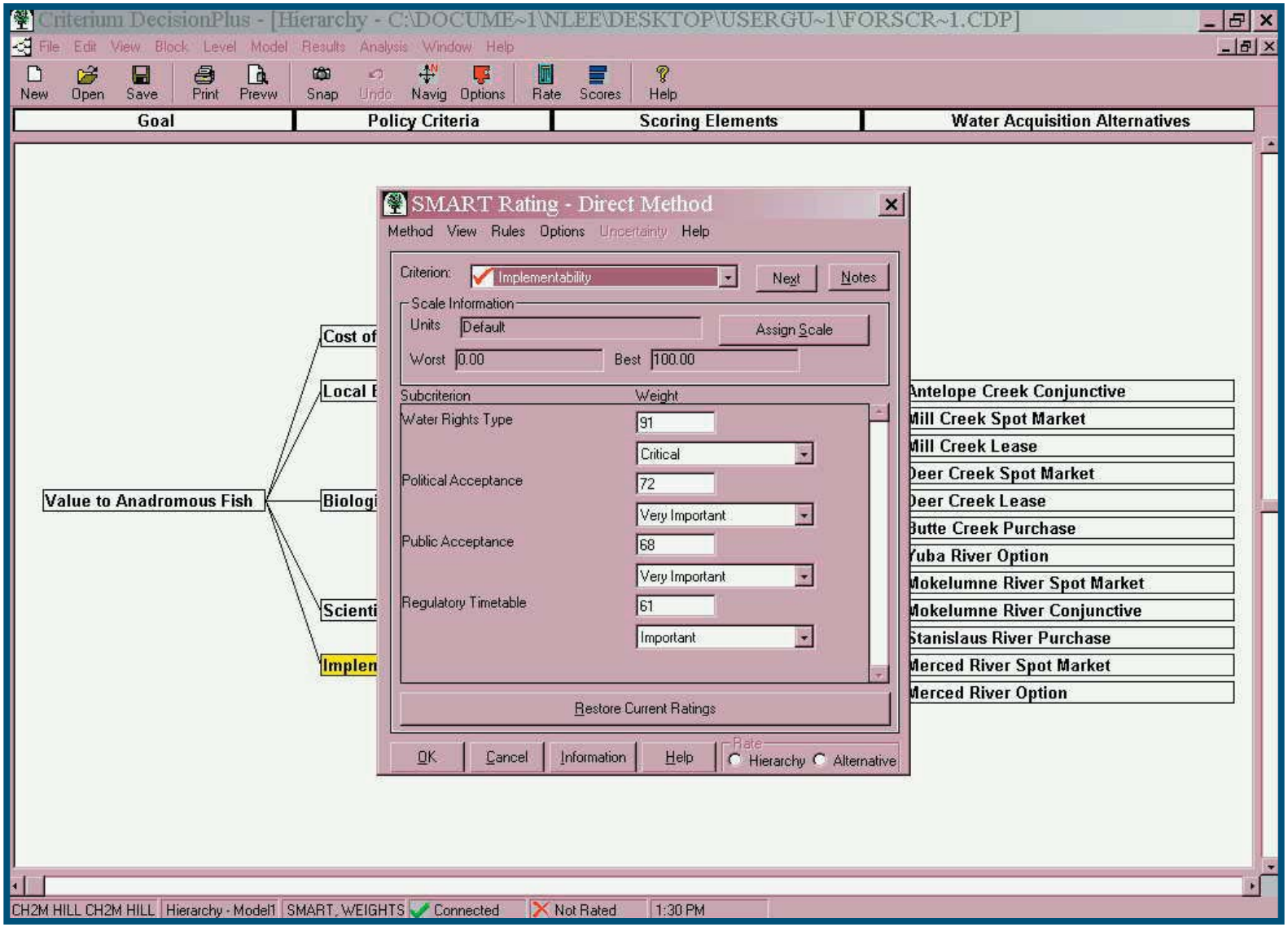
Scoring Elements for Biological Benefits

Double clicking on the Biological Benefits policy criterion block brings up a window with the weights of the scoring elements.



Scoring Elements for Implementability

Double clicking on the Implementability policy criterion block brings up a window with the weights of the scoring elements.



Description of Scoring Elements

Table 2 contains descriptions of each of the scoring elements and an assumed range each element's score may take on. These ranges may be refined as the DSM is applied to more real world alternatives. The ranges for the three measures of Cost, Life Stage, and Flow Value will most likely require refinement. Unlike the policy criteria and scoring element weights, changes in the range of scores do not need to be done using a group process. However, they must be justified and documented. Sets of alternatives ranked using different ranges for any scoring element may not be compared.

TABLE 2
DSM Scoring Elements, Scales, and Interpretation of Scale

Policy Criteria and Scoring Elements	Scoring Scale (Units)	Interpretation of Scoring Elements
Cost of Alternatives		Three aspects of cost are considered in the DSM, (1) Net present value, (2) unit costs, and (3) annualized costs. Normally only one of the metrics enters the DSM at a time with the maximum weight while the other two metrics are weighted at zero. The cost scales are inverse, where a higher number represents a lower value to anadromous fish. Higher costs imply a particular alternative is relatively more expensive and thus would lower its value to doubling anadromous fish by taking funds away from other acquisitions.
NPV of Costs	20,000 to 0 (NPV in 1000s of dollars)	The net present value (NPV) represents the present value of future costs discounted at the federal rate over the life of the transaction. This is an NPV of one-time up-front costs (e.g., agency negotiation costs, infrastructure, and lease and water rights payments) and annual recurring costs (annual agency administration, annual purchases of water, option fees, and operations and monitoring of water deliveries). These costs do not include biological or ecological monitoring.
Unit Costs (NPV)	250 to 0 (NPV in dollars/AF)	The unit costs of a transaction are calculated by dividing the NPV by the expected number of AF of water to be received over the life of a transaction. Longer term transactions will tend to have lower unit costs as any fixed costs of the transaction such as capital costs are spread out over more units of water.
Annualized Costs	2,000 to 0 (annualized dollars in 1,000s)	Annualized costs are calculated as the up front, one time costs amortized over 20 years (e.g., agency negotiation costs, infrastructure, and lease and water rights payments) plus the undiscounted variable water acquisition costs for the current year. By federal requirements, most water transactions have to be paid for up front. This measure demonstrates what annual costs would be if the transaction could be paid for over time.
Local Economic Impacts	-10 to +10 (constructed scale)	Local economic impacts are those impacts to the community resulting from water being transferred for an acquisition and not used for its original beneficial use within the community. A negative impact represents an economic loss to the community (e.g., agricultural fallowing). A positive impact represents an economic gain (e.g., sale of surplus water).
Biological Benefits		This policy criteria and its scoring elements capture the biological contribution of an acquisition to anadromous fish populations with respect to the size and seasonality of the acquisition, existing instream baseflow for a given water year type and recent and historic production. Two qualitative scoring elements capture effects on ecological functions or conditions within the drainage.
2x Objective-Absolute	0 to 20,000 (numbers of fish based on GrandTab)	This score represents the difference between the doubling goal and estimated recent natural production based on GrandTab or local data. The larger the difference, the farther a drainage is away from its doubling goal. It is assumed that potential acquisitions in drainages with larger deficits would be more beneficial to anadromous fish than in drainages with a smaller deficit. This measure also captures the effect of anadromous fish production within a drainage. Large drainages such as the Feather River and the Tuolumne River have a greater ability to support larger fish populations than smaller drainages such as Butte Creek or Antelope Creek.

Description of Scoring Elements, continued

TABLE 2
DSM Scoring Elements, Scales, and Interpretation of Scale

Policy Criteria and Scoring Elements	Scoring Scale (Units)	Interpretation of Scoring Elements
2x Objective-Distributed	0 to 100 (percent away from doubling goal based on GrandTab)	This score represents the distance a drainage is away from its doubling goal, expressed as a percentage and based on information from GrandTab or local data. The larger the percentage, the farther a drainage is away from its doubling goal. It is assumed that potential acquisitions for drainages with larger percentages would be more beneficial to anadromous fish than in drainages with a smaller deficit. By using a percentage, the effect of the size of a drainage on potential fish production is removed.
Life Stage	0 to 45 (constructed scale)	The monthly timing of water deliveries can affect the benefits realized by anadromous fish. Four life stages are identified by FWS and prioritized in AFRP 1996 and Jewell and Hamilton 2002 for individual drainages. If water is delivered in the most critical Chinook life stage within a drainage, it is given the highest monthly score. The scores are 8, 4, 2, and 1. The monthly scores are totaled for a Life Stage score. Potential acquisitions with higher life stage scores are assumed to be more valuable to anadromous fish.
Flow Value	0 to 4.5 (constructed scale)	Two factors influence the flow value of an acquisition: the size of an acquisition relative to a drainage's base flow in a given water year and the base flow relative to the target flow. It is assumed that the same size acquisition is more valuable when it is large relative to the baseflow or when the baseflow is small relative to the target flow. That is value to anadromous fish is higher for a large acquisition in a drainage with a low baseflow and a high target flow. The same size acquisition is assumed to be less valuable as baseflow increases towards the target. The rate of change of flow value is assumed to increase at a decreasing rate as the base flow of a drainage approaches target flow.
Endangered Species Benefits	0 or 1 (binary scale)	This scoring elements receives a score of 1 if a drainage has spring run Chinook. This gives priority to those streams with endangered spring run. Otherwise, it receives a value of 0. The spring run drainages are Mill, Deer, and Butte creeks.
Ecological Impairment	0 to 10 (constructed scale)	This is a measurement of physical impairment (e.g. barriers, poor water quality) within a drainage caused by factors other than instream flow. A score of 0 represents heavy impairment (none of the potential ecological benefits of a water acquisition are likely to be realized because the impairment cannot be overcome with the additional water) while 10 represents very low or no impairment (all to most potential ecological benefits of additional water will likely to be realized because the additional flow over comes impairments)
Ecological Improvements	0 to 10 (constructed scale)	This is a measurement of additional habitat-related benefits (e.g., cooler water temperature, cleaning gravel) that are realized from water acquisitions that increase instream flows. A score of 10 represents maximum benefits.
Scientific Information	0 to 10 (constructed scale)	This is a measurement of the potential to gain scientific information from studying the effects of increasing flows in a drainage. Long run acquisition agreements tend to offer greater opportunity for study and would receive a higher score.
Implementability		This policy criteria and its scoring elements shed light on how easy or difficult it is to implement a particular water acquisition alternative in terms of institutional requirements, political and public support, and length of time.
Water Right Type	0 to 10 (constructed scale)	The water right type affects how difficult it is to finalize a water transfer. 0 represents a water right that is extremely difficult or impossible to transfer (e.g. riparian or abandoned). 10 represents a validly held and uncontested water right.
Political Acceptance	0 to 10 (constructed scale)	This scoring element represents the political acceptance of a water transfer. 0 represents unanimous rejection by elected officials or political entities, and 10 represents unanimous acceptance.
Public Acceptance	0 to 10 (constructed scale)	This scoring element represents the public acceptance of a water transfer. 0 represents unanimous rejection by all public, non-governmental organizations, and stakeholder groups, and 10 represents unanimous support.
Regulatory Timetable	0 to 10 (constructed scale)	This scoring element represents the time required to address regulatory requirements of a water transfer. 0 represents the most time needed (e.g., first tier Environmental Impact Statement/Environmental Impact Report) and 10 represents the least amount of time needed (e.g., tiered Environmental Assessment)

DSM Workbook—Assumptions, Reports, and Navigation

After setting up the alternatives in CDP, data must be entered into the DSM workbook to generate scores and format scores to export to CDP. A user interface was built into the DSM workbook that contains the worksheets needed to streamline data entry and minimize the chance of inadvertently changing the scoring algorithms. The first tab of this workbook is for global assumptions and navigating the different screens.

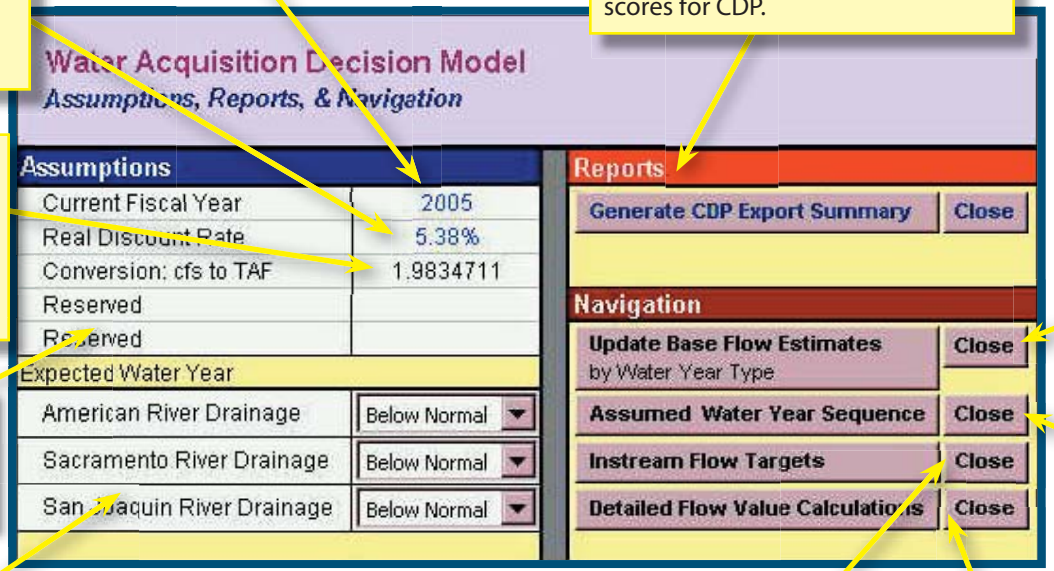
A. Enter the current fiscal year.

B. Enter the current federal discount rate applicable to the WAP.

C. Documentation of the conversion factor to change a cubic foot per second (CFA) flow rate to a thousand acre foot (TAF) measurement.

D. These two cells are reserved for assumptions that may be added in the future.

E. Enter the expected (or current) water year type for each watershed based on ECOSIM assumptions. The choices are wet, above normal, below normal, dry, and critically dry.



Reports

F. These buttons will open or close a report containing the formatted scores for CDP.

Navigation Buttons

The navigation buttons open and close different worksheets containing input data. These worksheets will be discussed in more detail in subsequent sections of this user's guide. A summary of the input data is provided in Table 3 on page 18.

G. Opens and closes a set of 5 worksheets that contain baseflow information for each of the 18 drainages represented in the DSM for the 5 water year types.

H. Opens and closes a worksheet that contains assumed water year sequences based on the historic record for each watershed. The sequences are used to determine a likely stream of costs associated with each acquisition for the calculation of the net present value, unit NPV costs, and annualized costs.

I. Opens and closes a table showing instream flow targets established by AFRP (1996). The targets are inputs into scoring some of the biological benefits.

J. Opens and closes a sheet showing the data and calculations for the flow value score of an alternative.

Summary of Input Data

TABLE 3
Input Data for the DSM

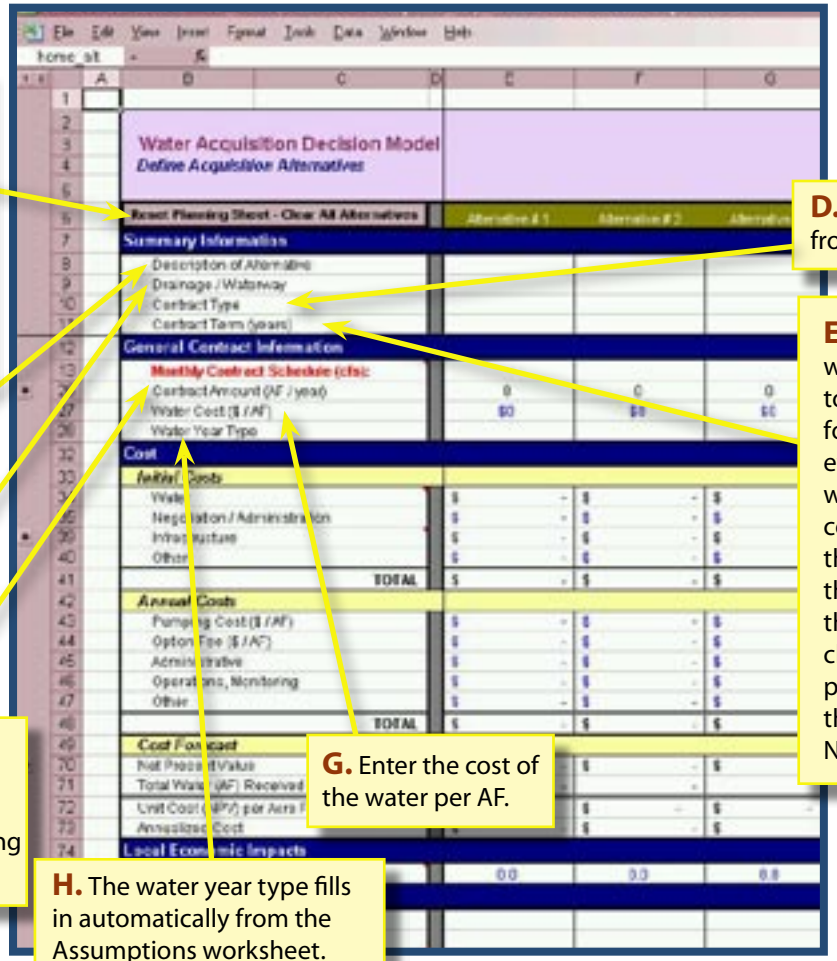
Input Data	Description of Input Data	Scoring Element
Unit Price of Water	The asking price of an acquisition alternative should be in the written response to the solicitation. Costs from previous water acquisitions and transfers should be used to evaluate proposed water costs related to acquisitions. Several agencies and entities collect information on water transfers, though price data are not always provided or published. The WAP keeps records of their historical acquisitions. The State Water Resources Control Board keeps records of transfers requiring Board approval. CalFed maintains the On Tap database of transfers. The Water Strategist Community publishes information on transfers.	Net Present Value of Costs Unit Costs (NPV) Annualized Costs
Salmon Escapement*	GrandTab is a spreadsheet database of estimated escapement by run, maintained by the CDFG for Clear, Battle, Mill, Deer, and Butte creeks and Feather, Yuba, Mokelumne, Stanislaus, Tuolumne, and Merced rivers. Due to budgetary constraints, GrandTab data are not collected for Cow, Cottonwood, Antelope, and Big Chico creeks and Bear, Cosumnes, and Calaveras rivers. CDFG district and regional sources of escapement estimates are used to supplement GrandTab data.	2x Objective – Absolute 2x Objective – Distributed
Life Stage Priorities	Life stage priorities were established based on the 4 life stages identified in AFRP (1996) and information in Jewell and Hamilton (2002). The water delivered in the Chinook life stage that would benefit Chinook the most in a drainage is given the highest priority value. The priority values are 8, 4, 2, and 1. These are values developed for the DSM and may be changed in the future if there is justification for an alternative set of values	Life Stage
Instream Flow Target	The instream flow target is the ideal instream flow for a given life stage of a particular fishery. The difference between this metric and base instream flow is the flow deficit. FWS issued draft guidelines in 1996 recommending target flows for multiple fishery needs pursuant to CVPIA for the Feather, Yuba, Bear, Mokelumne, Calaveras, Stanislaus, Tuolumne, and Merced rivers. Jewell and Hamilton produced a staff report in 2002 recommending target flows for Cow, Cottonwood, Antelope, Mill, Deer, Big Chico, and Butte creeks and Cosumnes River. Clear Creek and Battle Creek do not have recommended target flows.	Flow Value
Instream Base Flow	ECOSIM, a hydrologic simulation model of all major streams and rivers tributary to the Sacramento-San Joaquin Delta, provides monthly and annual base instream flow conditions for all water year types. ECOSIM may be updated to show changes in instream flows associated with long term or permanent water acquisitions; and for simulating how acquisitions affect system operations and meeting environmental standards.	Flow Value
Local Knowledge	Knowledge from local stakeholders and agency staff working on a particular drainage. These data could be quantitative, but most likely be anecdotal or qualitative, but would be the most recent and accurate available.	All the scoring elements

* Escapement is the number of fish successfully reaching spawning areas, having escaped harvest and other causes of mortality.

Defining Acquisition Alternatives

Summary Information and General Contract Information

Enter descriptive information and scores regarding each alternative into this worksheet. The order of the entries must be identical to the order of the alternatives listed in CDP. Currently the worksheet can accept information for up to 20 alternatives. If there are more than 20 alternatives to be ranked, enter them as sets of 20 or fewer. Export each set of data to the DSM and run them separately. Take all the ranked lists and manually put the alternatives in order by overall score. This is possible because the alternatives are ranked by their scores and the policy criteria and scoring element weights. The alternatives are independent of each other. Care should be taken to keep the assumptions between the two sets of alternatives identical.



A. Click this button to reset all the information on this worksheet regarding the alternatives. This will clear all the information that has been entered regardless of whether the file has been saved. If the file has been saved, the user may close the file just like any Microsoft Excel file and return to the file without losing any data.

B. Use a unique description to identify an alternative.

C. Choose a drainage from the drop down menu.

D. Choose a contract type from the drop down menu.

E. Enter the length of the contract. A window will pop-up to remind the user to enter a contract length of 20 years for water right purchase agreements even though the FWS would own the water right into perpetuity. A 20-year contract length is used because this is the foreseeable planning horizon for the FWS in which the FWS may maintain the use of water rights for the WAP or change its use to another environmental purpose or sell it. The benefit of owning the water right is accounted for in the NPV Calculation.

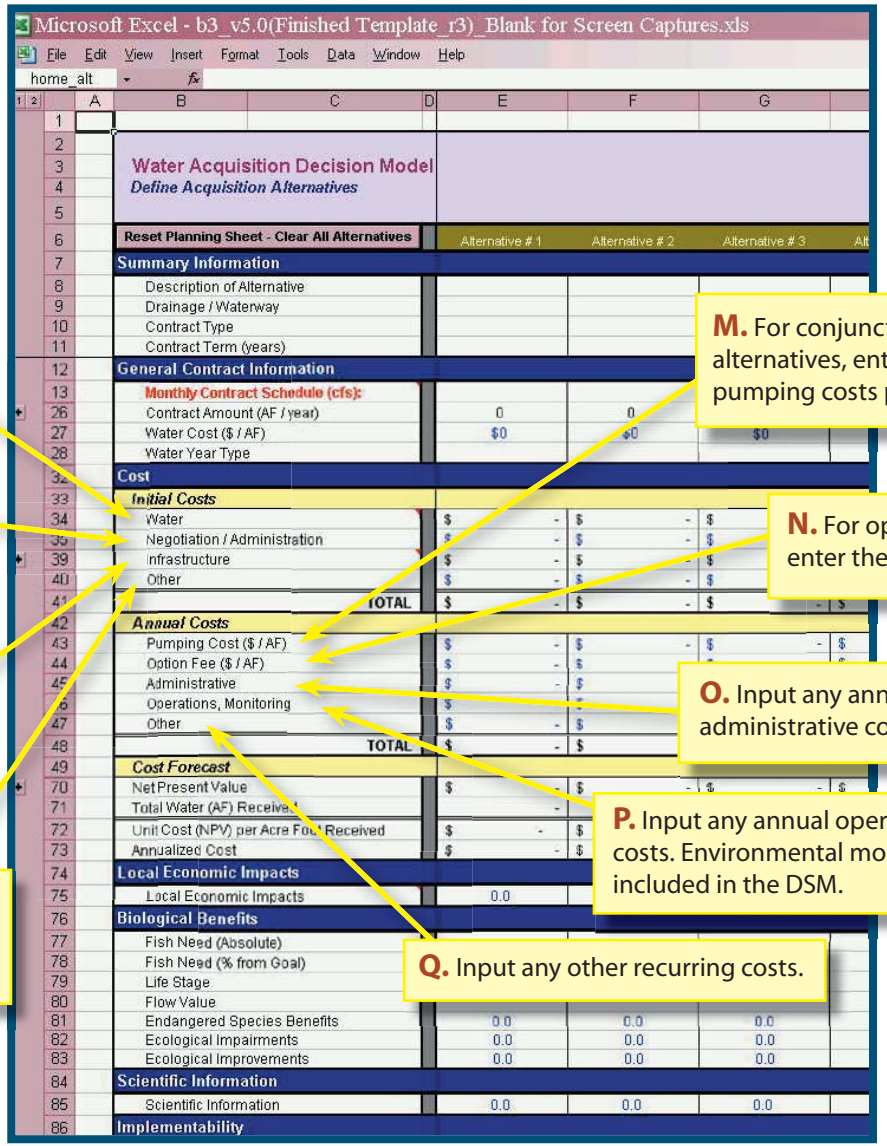
F. Click on the "+" button to expand the Contract Amount (AF/year). See page 22 for details regarding the expanded rows.

G. Enter the cost of the water per AF.

H. The water year type fills in automatically from the Assumptions worksheet.

Defining Acquisition Alternatives, continued

Initial and Annual Cost



I. The cost of the water is calculated automatically based on the unit cost and volume of water.

J. Input any one-time negotiation or administrative costs associated with acquiring the water.

K. Click on the "+" button to expand the rows for inputting Infrastructure Costs. See page 23 for details regarding the expanded rows.

L. Input any other one-time costs associated with an alternative.

M. For conjunctive use alternatives, enter the pumping costs per AF.

N. For option contracts, enter the option fee.

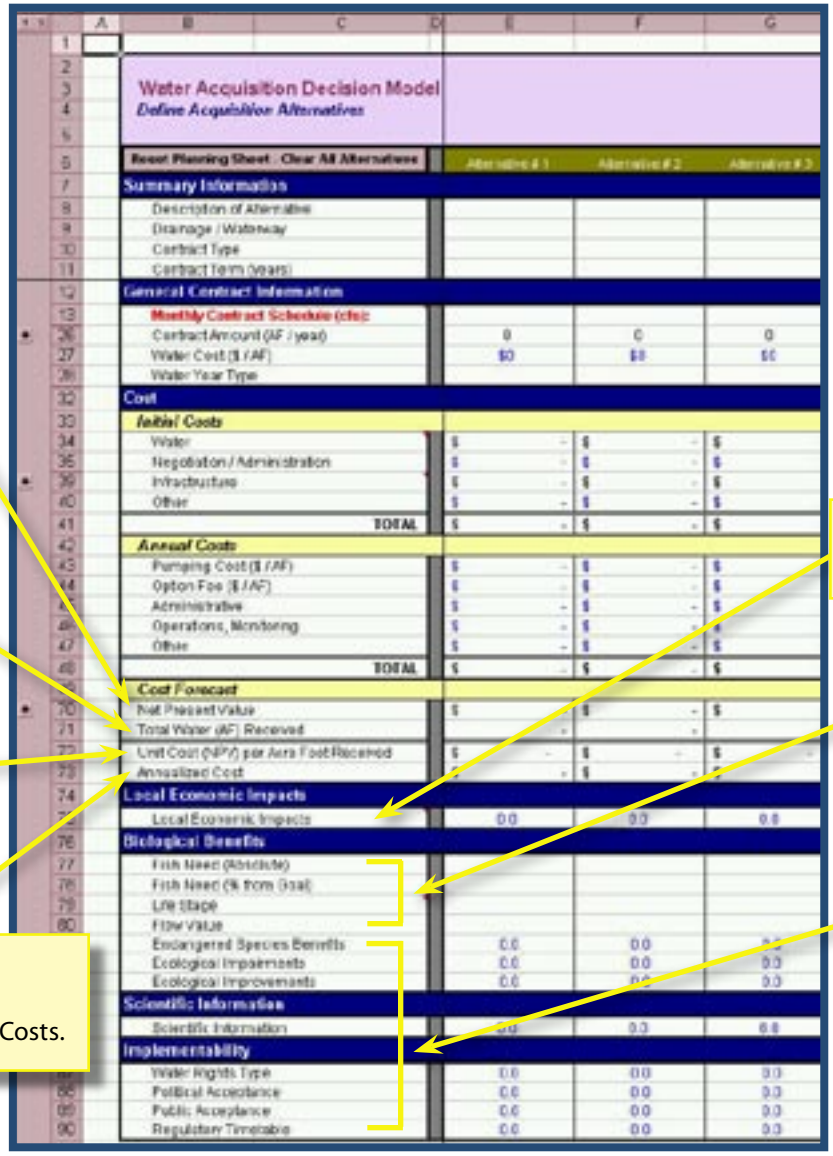
O. Input any annual administrative costs.

P. Input any annual operations and monitoring costs. Environmental monitoring costs are not included in the DSM.

Q. Input any other recurring costs.

Defining Acquisition Alternatives, continued

Net Present Value, Local Economic Impacts, Biological Benefits, Scientific Information, and Implementability



R. Click on the "+" button to expand the rows associated with calculating NPV. See page 24 for details regarding the expanded rows.

S. The total amount of water received over the life an alternative is calculated automatically based on annual deliveries and duration of the contract.

T. The unit cost of water for an alternative is calculated automatically based on NPV and Total Water (AF) Received.

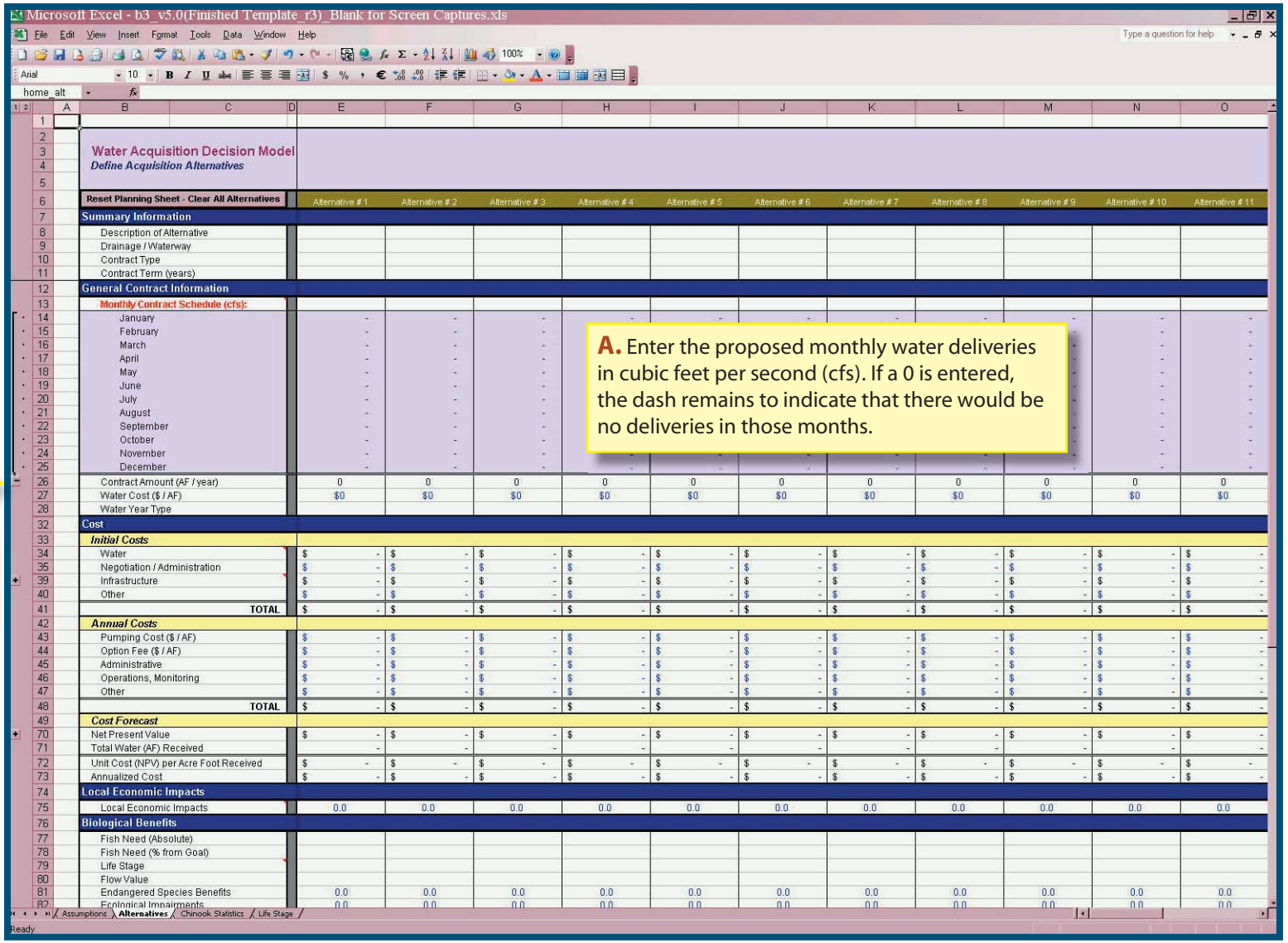
U. Annualized cost of an alternative is calculated automatically based on the Discount Rate, Initial Costs, and Annual Costs.

V. Input the qualitative Local Economic Impacts score.

W. Fish Need (Absolute), Fish Need (% from Goal), Life Stage, Flow Value scores will be calculated automatically.

X. Input the qualitative Endangered Species, Ecological Impairments, Ecological Improvements, Scientific Information, Water Rights Type, Political Acceptance, Public Acceptance, and Regulatory Timetable scores.

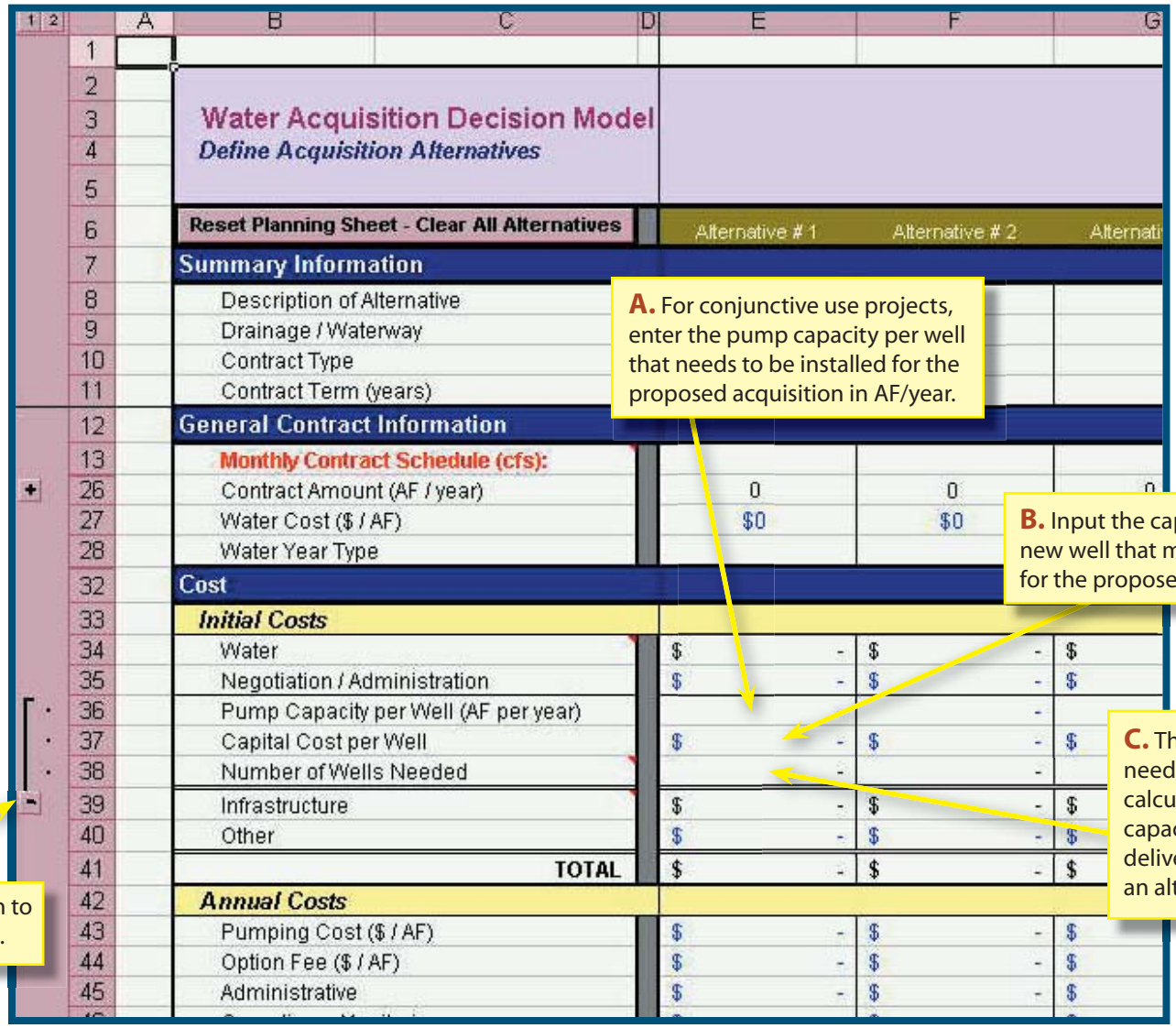
Expanding Monthly Contract Schedule



A. Enter the proposed monthly water deliveries in cubic feet per second (cfs). If a 0 is entered, the dash remains to indicate that there would be no deliveries in those months.

B. Click the "–" button to collapse the monthly schedule rows.

Expanding Infrastructure Costs



	A	B	C	D	E	F	G
1							
2							
3		Water Acquisition Decision Model					
4		*Define Acquisition Alternatives*					
5							
6		Reset Planning Sheet - Clear All Alternatives			Alternative # 1	Alternative # 2	Alternati
7		**Summary Information**					
8		Description of Alternative					
9		Drainage / Waterway					
10		Contract Type					
11		Contract Term (years)					
12		**General Contract Information**					
13		Monthly Contract Schedule (cfs):					
26		Contract Amount (AF / year)			0	0	0
27		Water Cost ($ / AF)			$0	$0	
28		Water Year Type					
32		**Cost**					
33		*Initial Costs*					
34		Water			$ -	$ -	$
35		Negotiation / Administration			$ -	$ -	$
36		Pump Capacity per Well (AF per year)				-	
37		Capital Cost per Well			$ -	$ -	$
38		Number of Wells Needed			-	-	
39		Infrastructure			$ -	$ -	$
40		Other			$ -	$ -	$
41		TOTAL			$ -	$ -	$
42		*Annual Costs*					
43		Pumping Cost ($ / AF)			$ -	$ -	$
44		Option Fee ($ / AF)			$ -	$ -	$
45		Administrative			$ -	$ -	$

A. For conjunctive use projects, enter the pump capacity per well that needs to be installed for the proposed acquisition in AF/year.

B. Input the capital cost per new well that must be installed for the proposed acquisition.

C. The number of wells needed is automatically calculated using the pump capacity and the annual deliveries associated with an alternative.

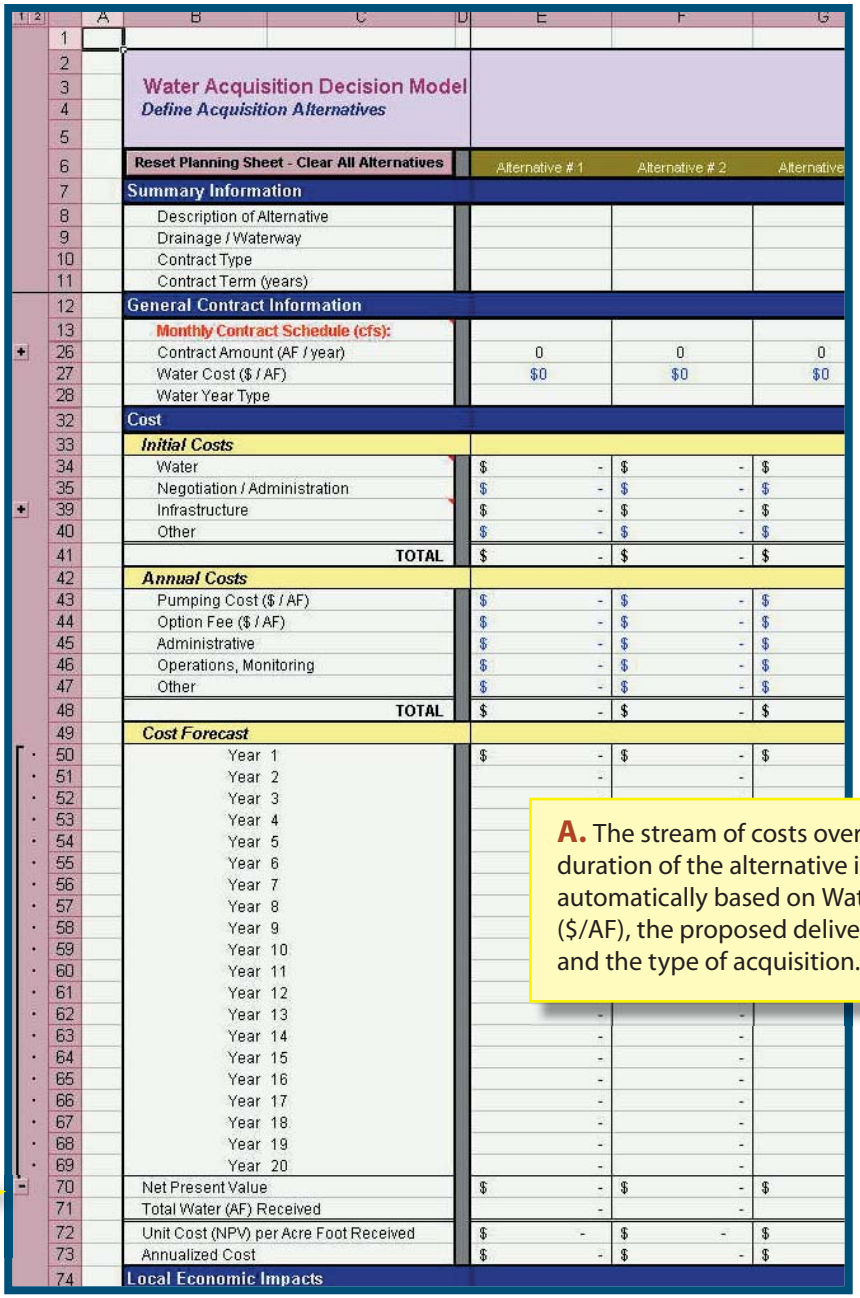
D. Click the "–" button to collapse the cost rows.

Expanding Net Present Value

There are four basic types of water acquisitions. They are spot market, conjunctive use, long-term leases or purchases, and option contracts. In the DSM workbook, the long term leases and purchases are shown separately because the cost calculations for each are different. Additional discussion may be found in the section "Details of NPV Calculation." Note that in the sense of anadromous fish benefits from acquiring water with either contract type they are similar and thus, considered to be one type of transaction.

The DSM assumes that different acquisitions are utilized in different water year types and, therefore, the pattern of costs reflects the type of acquisition.

- Spot Market—assumed to be utilized in any water year type.
- Conjunctive Use—assumes water is pumped in below normal, dry, and critically dry years.
- Long-term leases and purchase of water rights—assumed to be utilized in all water year types.
- Option contracts—assumed to be exercised in above normal, below normal, dry, and critically dry water year types.



A. The stream of costs over the duration of the alternative is calculated automatically based on Water Cost ($/AF), the proposed delivery amounts, and the type of acquisition.

B. Click the "–" button to collapse the NPV rows.

Chinook Statistics

These data are from the AFRP, DFG, and local experts regarding Chinook escapement and the doubling goal of each drainage.

A. GrandTab data are available from the California Department of Fish and Game, Native Anadromous Fish and Watershed Branch, Native Anadromous Fish Team, Sacramento, CA 95814, (916) 327-8840.

B. Spring run numbers are used in the DSM when they are available, otherwise the drainage is assumed to be a fall run.

C. This is the doubling goal for natural production (offspring of adults that spawn without the assistance of a hatchery) established by AFRP (1995).

D. This is the AFRP (1995) estimate of natural Chinook production during the 1967-1991 "baseline" period.

E. Escapement is the population of adult fish that avoid or "escape" sources of mortality to successfully arrive at their natal spawning drainages. Baseline escapement is an average escapement for the 1967-1991 baseline period reported by AFRP (1995).

Recent (1998-2003) versus Baseline (1967-1991) Chinook Statisitics, by Drainage and Race

Calculation of Fish Need - Absolute and % from Goal

(Based on 26 April 2004 Version of GrandTab)

Drainage	Chinook Race	CVPIA 2X Goal Natural Production[10]	Baseline Natural Production	Baseline Escapement	Baseline Conversion Ratio	Recent Escapement	Recent Natural Production	Recent Production Relative to CVPIA 2X Goal		Recent Escapement Relative to 2X Baseline		Fish Need (Absolute)	Fish Need (% from Goal)
								#	%	%	#	#	%
Clear Creek	fall run	7,100	3,600	1,600	2.25	9,227	20,761	13,661	292%	288%	6,027	-	0%
Cow Creek	fall run [1]	4,600	2,300	1,400	1.64	1,000	1,643	(2,957)	36%	36%	(1,800)	2,957	64%
Cottonwood Creek	fall run [1]	5,900	3,000	1,600	1.88	1,000	1,875	(4,025)	32%	31%	(2,200)	4,025	68%
Battle Creek	fall run [2]	10,000	5,000	18,000	0.28	172,490	47,914	37,914	479%	479%	136,490	-	0%
	late fall run [9]	550	270	1,000	0.27	4,280	1,156	606	210%	214%	2,280	-	0%
Antelope Creek	fall run [1]	720	360	190	1.89	-	-	(720)	0%	0%	(380)	720	100%
Mill Creek	fall run [3]	4,200	2,100	1,100	1.91	1,851	3,553	(647)	85%	85%	(339)	647	15%
	spring run	4,400	2,200	800	2.75	942	2,591	(1,810)	59%	59%	(658)	1,810	41%
Deer Creek	fall run [4]	1,500	760	410	1.85	270	500	(1,000)	33%	33%	(550)	1,000	67%
	spring run	6,500	3,300	1,300	2.54	1,779	4,516	(1,984)	69%	68%	(821)	1,984	31%
Butte Creek	fall run [5]	1,500	760	420	1.81	1,985	3,592	2,092	239%	236%	1,145	-	0%
	spring run	2,000	1,000	360	2.78	8,474	23,539	21,539	1177%	1177%	7,754	-	0%
Big Chico Creek	fall run [6]	800	400	240	1.67	100	167	(633)	21%	21%	(380)	633	79%
Feather River	fall run [2]	170,000	86,000	49,000	1.76	98,251	172,441	2,441	101%				
Yuba River	fall run	66,000	33,000	13,000	2.54	24,110	61,202	(4,798)	93%				
Bear River	fall run [7]	450	220	100	2.20	200	440	(10)	98%				
Mokelumne River	fall run [2]	9,300	4,700	3,300	1.42	7,727	11,005	1,705	118%				
Cosumnes River	fall run [8]	3,300	1,600	760	2.11	300	632	(2,668)	19%				
Calaveras River	winter run	2,200	1,100	410	2.68	-	-	(2,200)	0%				
Stanislaus River	fall run	22,000	11,000	4,800	2.29	6,480	14,850	(7,150)	68%				
Tuolumne				8,000	2.13	8,703	18,679	(19,421)	49%				
Merced								(3,684)	80%				

Notes:

[1] Cow ... monitoring program

[2] Battle ... hery and in river fis

[3] Mill C ... ly

[4] Deer ... ly

[5] Butte Creek current FRC escapement is 4 year average only

[6] Big Chico Creek current FRC escapement estimated by Paul Ward (CDFG); creek has no monitoring program

[7] Bear River current FRC escapement per John Nelson/Wade Johnson (CDFG); creek has no monitoring program

[8] Cosumnes River current FRC escapement per Rob Titus (CDFG); river has no monitoring program

[9] Battle Creek current LFRC escapement is 4 year average only

[10] Production = escapement + ocean harvest + river harvest

Chinook Statistics, continued

F. This is Baseline Natural Production divided by Baseline Escapement. In general, a value lower than 1 indicates hatchery escapements were counted with native fish. A high value indicates high mortality and/or low to no hatchery escapements. This historic ratio (1967-1991) is held constant for purposes of calculating Recent Natural Production.

G. This is a running average of escapement over the most recent 6 years of the record, as reported in GrandTab. These are the GrandTab values that should be verified as the most current each time the DSM is run.

H. This is an estimate of "current" natural production, derived by multiplying the Baseline Conversion Ratio by Recent Escapement. Recent Natural Production may be more precisely estimated by considering current mortality estimates and current hatchery operations.

I. These are the difference between Recent Natural Production and the doubling goal. A positive number or percent greater than 100 indicates the goal has been met.

J. These are the difference between Recent Natural Production and Baseline Escapement. This term is not used directly in the DSM.

K. These are the expression of fish need. Drainages that have met or exceeded their natural production doubling goals have no fish need. Absolute Fish Need is the number of fish yet to be naturally produced to meet the AFRP (1995) doubling goal. Percent Fish Need (if greater than 0%) is the proportion of the natural production goal yet to be achieved.

Recent (1998-2003) versus Baseline (1967-1991) Chinook Statisitics, by Drainage and Race

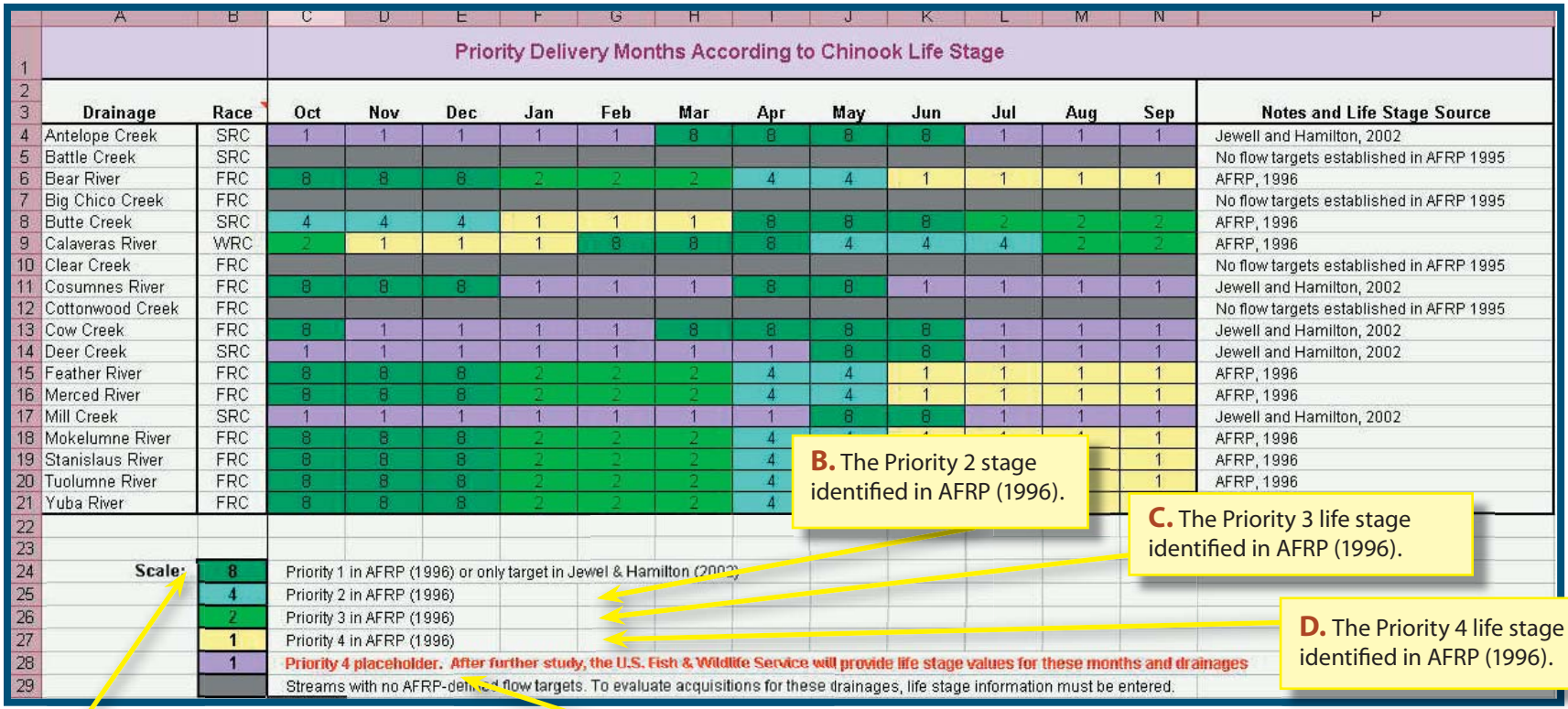
Calculation of Fish Need - Absolute and % from Goal

(Based on 26 April 2004 Version of GrandTab)

			CVPIA 2X Goal Natural Production[10]	Baseline Natural Production	Baseline Escapement	Baseline Conversion Ratio	Recent Escapement	Recent Natural Production	Recent Production Relative to CVPIA 2X Goal		Recent Escapement Relative to 2X Baseline		Fish Need (Absolute)	Fish Need (% from Goal)
									#	%	%	#	#	%
			7,100	3,600	1,600	2.25	9,227	10,761	13,661	292%	288%	6,027	-	0%
			4,600	2,300	1,400	1.64	1,000	1,643	(2,957)	36%	36%	(1,800)	2,957	64%
			5,900	3,000	1,600	1.88	1,000	1,875	(4,025)	31%	31%	(2,200)	4,025	68%
			10,000	5,000	18,000	0.28	172,490	47,914	37,914	479%	479%	136,490	-	0%
		[9]	550	270	1,000	0.27	4,280	1,156	606	210%	214%	2,280	-	0%
					190	1.89	-	-	(720)	0%	0%	(380)	720	100%
					100	1.91	1,661	3,553	(647)	85%	85%	(339)	647	15%
					800				(1,8				1,810	41%
					410				(1,0				1,000	67%
					300				(1,9				1,984	31%
					420				2,0				-	0%
					360				21,5				-	0%
					240				(6				633	79%
					000				2,4				-	0%
21	Yuba River	fall run			000				(4,7				4,798	7%
22	Bear River	fall run [7]			100				(				10	2%
23	Mokelumne River	fall run [2]			300				1,7				-	0%
24	Cosumnes River	fall run [8]			760				(2,6				2,668	81%
25	Calaveras River	winter run			410				(2,2				2,200	100%
26	Stanislaus River	fall run			800				(7,1				7,150	33%
27	Tuolumne River	fall run			900				(19,4				9,421	51%
28	Merced River	fall run [2]			500				(3,6				3,684	20%
29														
30	**Notes:**													
31	[1] Cow and Cottonwood creeks' current FRC escapement estimated by Colle													
32	[2] Battle Creek, Feather, Mokelumne, and Merced rivers' current FRC escape													
33	[3] Mill Creek current FRC escapement is 3 year average only													
34	[4] Deer Creek current FRC escapement is 1 year (1998) only													
35	[5] Buttte Creek current FRC escapement is 4 year average only													
36	[6] Big Chico Creek current FRC escapement estimated by Paul Ward (CDFG); creek has no monitoring program													
37	[7] Bear River current FRC escapement per John Nelson/Wade Johnson (CDFG); creek has no monitoring program													
38	[8] Cosumnes River current FRC escapement per Rob Titus (CDFG); river has no monitoring program													
39	[9] Battle Creek current LFRC escapement is 4 year average only													
40	[10] Production = escapement + ocean harvest + river harvest													

Life Stage

The Life Stage worksheet documents the assumed life stage priorities. These life stage priorities (8, 4, 2, 1) were arbitrarily assigned and may be refined as the DSM is applied to more real world alternatives and insights are gained. The changes do not need to take place in a stakeholder group process, but they must be justified and documented.



Priority Delivery Months According to Chinook Life Stage

Drainage	Race	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Notes and Life Stage Source
Antelope Creek	SRC	1	1	1	1	1	8	8	8	8	1	1	1	Jewell and Hamilton, 2002
Battle Creek	SRC													No flow targets established in AFRP 1995
Bear River	FRC	8	8	8	2	2	2	4	4	1	1	1	1	AFRP, 1996
Big Chico Creek	FRC													No flow targets established in AFRP 1995
Butte Creek	SRC	4	4	4	1	1	1	8	8	8	2	2	2	AFRP, 1996
Calaveras River	WRC	2	1	1	1	8	8	8	4	4	4	2	2	AFRP, 1996
Clear Creek	FRC													No flow targets established in AFRP 1995
Cosumnes River	FRC	8	8	8	1	1	1	8	8	1	1	1	1	Jewell and Hamilton, 2002
Cottonwood Creek	FRC													No flow targets established in AFRP 1995
Cow Creek	FRC	8	1	1	1	1	8	8	8	8	1	1	1	Jewell and Hamilton, 2002
Deer Creek	SRC	1	1	1	1	1	1	1	8	8	1	1	1	Jewell and Hamilton, 2002
Feather River	FRC	8	8	8	2	2	2	4	4	1	1	1	1	AFRP, 1996
Merced River	FRC	8	8	8	2	2	2	4	4	1	1	1	1	AFRP, 1996
Mill Creek	SRC	1	1	1	1	1	1	1	8	8	1	1	1	Jewell and Hamilton, 2002
Mokelumne River	FRC	8	8	8	2	2	2	4					1	AFRP, 1996
Stanislaus River	FRC	8	8	8	2	2	2	4					1	AFRP, 1996
Tuolumne River	FRC	8	8	8	2	2	2	4					1	AFRP, 1996
Yuba River	FRC	8	8	8	2	2	2	4						

Scale:	
8	Priority 1 in AFRP (1996) or only target in Jewel & Hamilton (2002)
4	Priority 2 in AFRP (1996)
2	Priority 3 in AFRP (1996)
1	Priority 4 in AFRP (1996)
1	Priority 4 placeholder. After further study, the U.S. Fish & Wildlife Service will provide life stage values for these months and drainages
	Streams with no AFRP-defined flow targets. To evaluate acquisitions for these drainages, life stage information must be entered.

A. This is the highest life stage priority weight. It is used for AFRP (1996) identified Priority 1 life stage and the single life stage identified in Jewell and Hamilton (2002).

B. The Priority 2 stage identified in AFRP (1996).

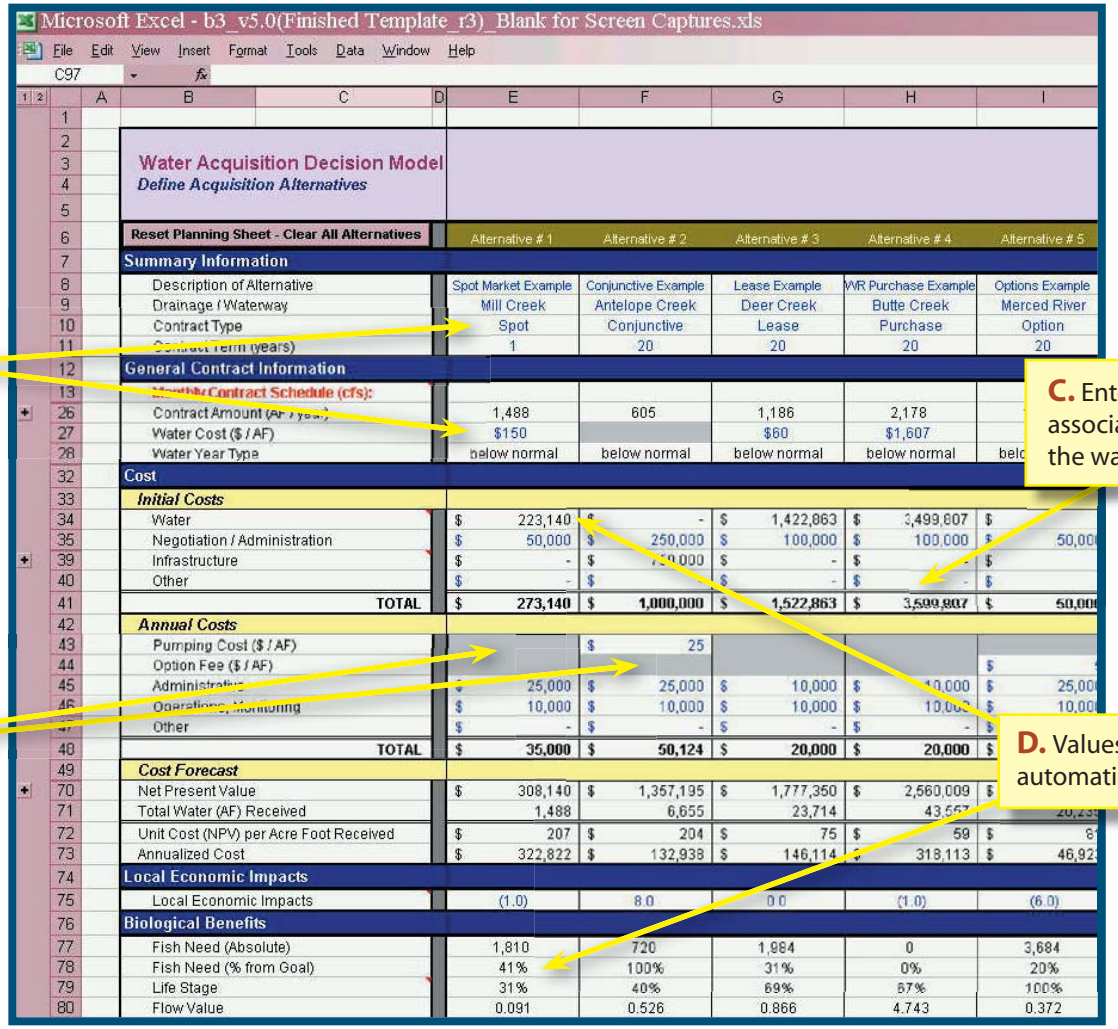
C. The Priority 3 life stage identified in AFRP (1996).

D. The Priority 4 life stage identified in AFRP (1996).

E. For the drainages that only have one life stage identified (Antelope, Cosumnes, Cow, Deer, and Mill) a priority weight of 1 is used in the other months to indicate that providing water in these months has inherent value even though specific species or habitat benefits have not been explicitly identified. This weight acts as a placeholder until the FWS identifies Chinook life stages for these drainages.

Example of Populated Alternatives

This is an example of what the Alternatives worksheet would look like populated with data for potential water acquisitions. The four types of alternatives are represented. The long term lease and water right purchase examples are shown separately because their costs are calculated differently, but they are similar enough in implementation that they are considered one type of acquisition. Note that the text in cells requiring input data are in blue and if a cell does not apply to a type acquisition, the cell is grey. Values that are automatically calculated are in black.



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C97

Water Acquisition Decision Model

Define Acquisition Alternatives

	Reset Planning Sheet - Clear All Alternatives	Alternative # 1	Alternative # 2	Alternative # 3	Alternative # 4	Alternative # 5
Summary Information						
	Description of Alternative	Spot Market Example	Conjunctive Example	Lease Example	WR Purchase Example	Options Example
	Drainage / Waterway	Mill Creek	Antelope Creek	Deer Creek	Butte Creek	Merced River
	Contract Type	Spot	Conjunctive	Lease	Purchase	Option
	Contract Term (years)	1	20	20	20	20
General Contract Information						
	Monthly Contract Schedule (cfs):					
	Contract Amount (AF / year)	1,488	605	1,186	2,178	
	Water Cost ($ / AF)	$150		$60	$1,607	
	Water Year Type	below normal	below normal	below normal	below normal	belo
Cost						
	Initial Costs					
	Water	$ 223,140	$ -	$ 1,422,863	$ 3,499,607	$
	Negotiation / Administration	$ 50,000	$ 250,000	$ 100,000	$ 100,000	$ 50,00
	Infrastructure	$ -	$ 750,000	$ -	$ -	$
	Other	$ -	$	$ -	$ -	$
	TOTAL	$ 273,140	$ 1,000,000	$ 1,522,863	$ 3,599,607	$ 50,00
	Annual Costs					
	Pumping Cost ($ / AF)		$ 25			
	Option Fee ($ / AF)					$
	Administrative	$ 25,000	$ 25,000	$ 10,000	$ 10,000	$ 25,00
	Operations, Monitoring	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,00
	Other	$ -	$ -	$ -	$ -	$
	TOTAL	$ 35,000	$ 50,124	$ 20,000	$ 20,000	$
	Cost Forecast					
	Net Present Value	$ 308,140	$ 1,357,195	$ 1,777,350	$ 2,560,009	$
	Total Water (AF) Received	1,488	6,655	23,714	43,567	20,25
	Unit Cost (NPV) per Acre Foot Received	$ 207	$ 204	$ 75	$ 59	$ 8
	Annualized Cost	$ 322,822	$ 132,938	$ 146,114	$ 318,113	$ 46,92
Local Economic Impacts						
	Local Economic Impacts	(1.0)	8.0	0.0	(1.0)	(6.0)
Biological Benefits						
	Fish Need (Absolute)	1,810	720	1,984	0	3,684
	Fish Need (% from Goal)	41%	100%	31%	0%	20%
	Life Stage	31%	40%	69%	67%	100%
	Flow Value	0.091	0.526	0.866	4.743	0.372

A. Cells requiring input data

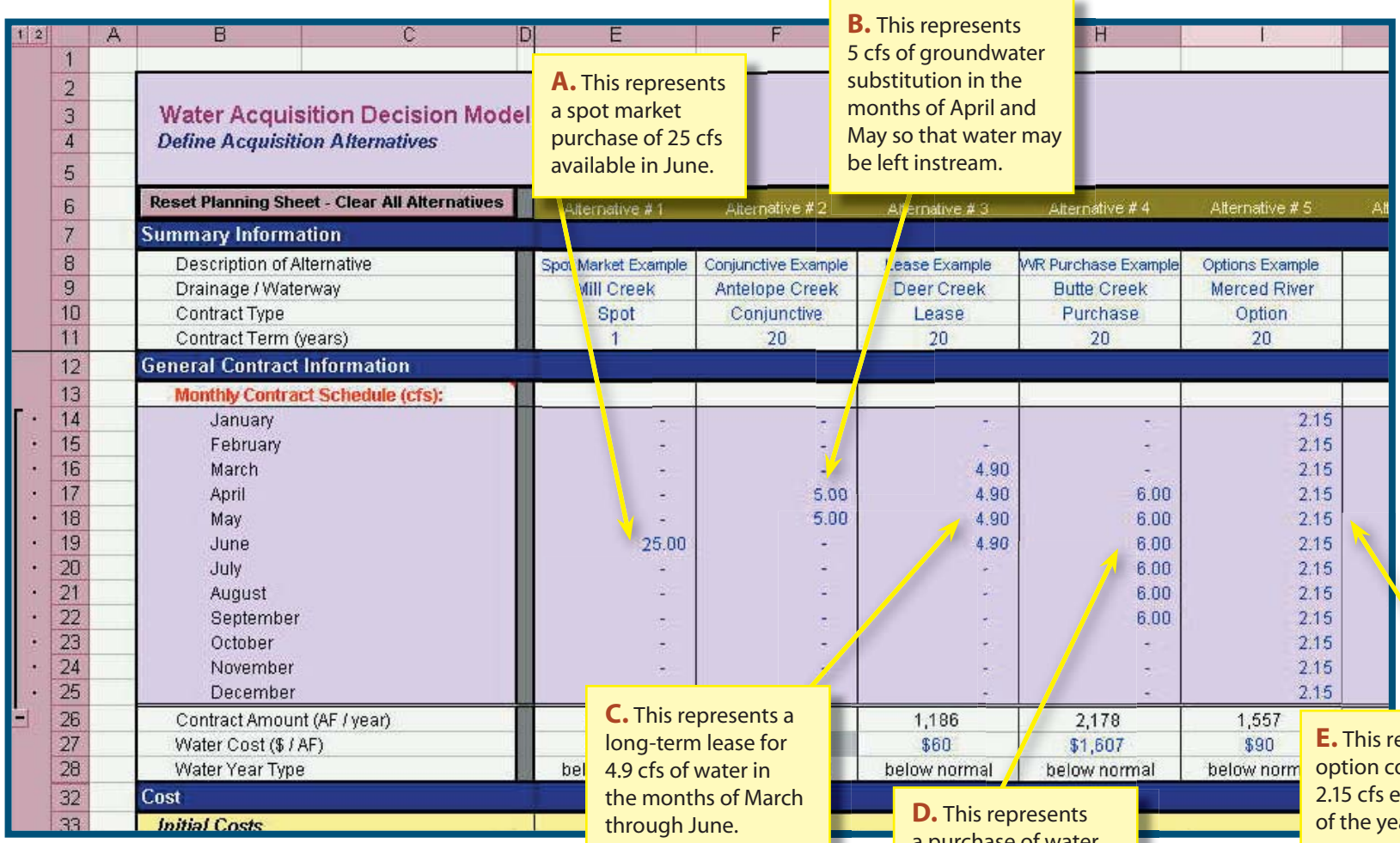
B. Cells that are not applicable to the acquisition type

C. Enter appraisal costs associated with purchasing the water right here

D. Values that are automatically calculated

Example of Populated Contract Schedule

This is an example of the Monthly Contract Schedule populated with data. The amount available each month may vary and this information would be in the response to the solicitation of willing sellers.



Water Acquisition Decision Model
Define Acquisition Alternatives

Reset Planning Sheet - Clear All Alternatives

	Alternative # 1	Alternative # 2	Alternative # 3	Alternative # 4	Alternative # 5
Summary Information					
Description of Alternative	Spot Market Example	Conjunctive Example	Lease Example	WR Purchase Example	Options Example
Drainage / Waterway	Mill Creek	Antelope Creek	Deer Creek	Butte Creek	Merced River
Contract Type	Spot	Conjunctive	Lease	Purchase	Option
Contract Term (years)	1	20	20	20	20
General Contract Information					
Monthly Contract Schedule (cfs):					
January	-	-	-	-	2.15
February	-	-	-	-	2.15
March	-	-	4.90	-	2.15
April	-	5.00	4.90	6.00	2.15
May	-	5.00	4.90	6.00	2.15
June	25.00	-	4.90	6.00	2.15
July	-	-	-	6.00	2.15
August	-	-	-	6.00	2.15
September	-	-	-	6.00	2.15
October	-	-	-	-	2.15
November	-	-	-	-	2.15
December	-	-	-	-	2.15
Contract Amount (AF / year)			1,186	2,178	1,557
Water Cost ($ / AF)			$60	$1,607	$90
Water Year Type	bel		below normal	below normal	below norm
Cost					
Initial Costs					

A. This represents a spot market purchase of 25 cfs available in June.

B. This represents 5 cfs of groundwater substitution in the months of April and May so that water may be left instream.

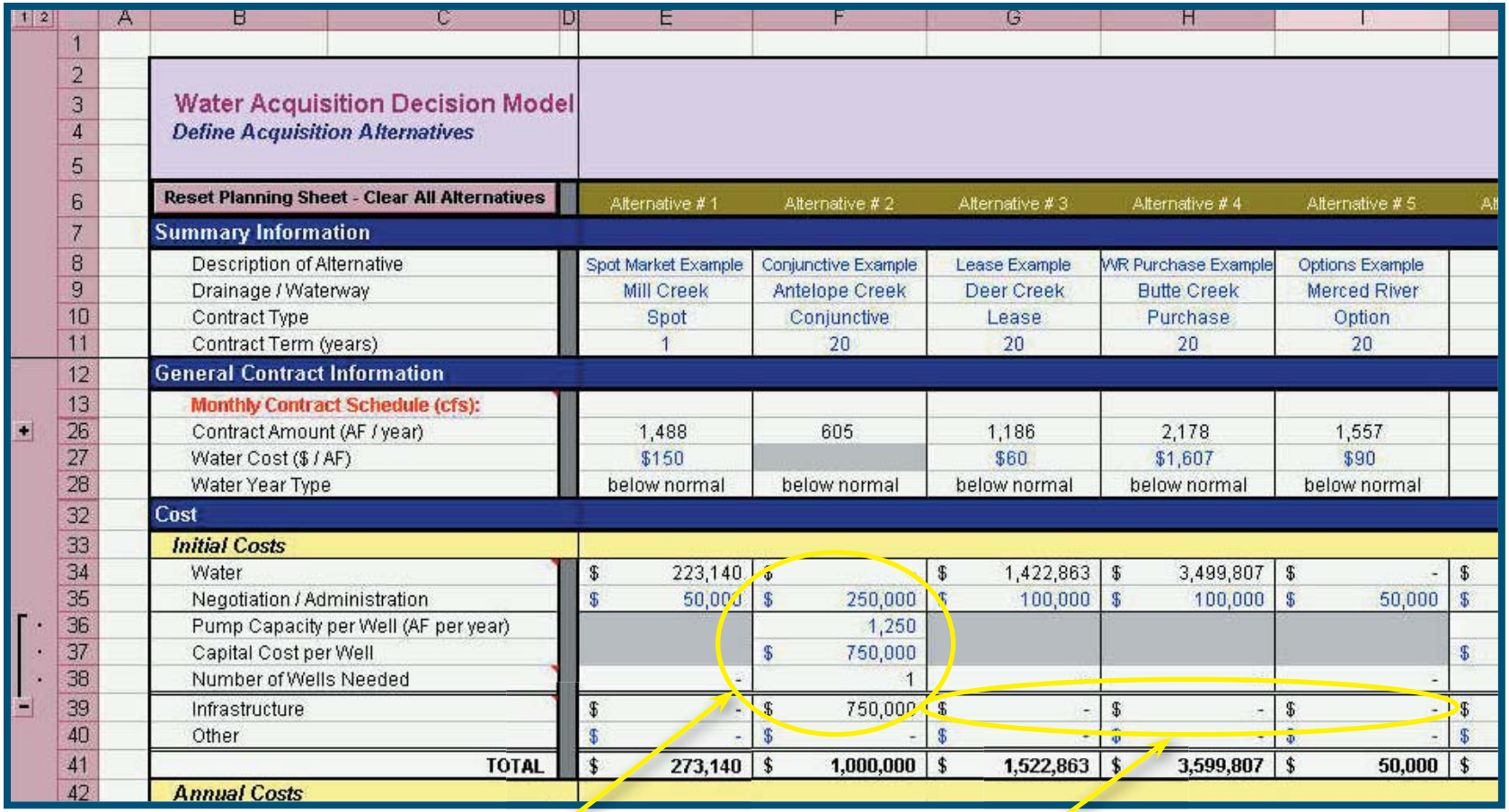
C. This represents a long-term lease for 4.9 cfs of water in the months of March through June.

D. This represents a purchase of water rights to divert up to 6.0 cfs from April to September.

E. This represents an option contract for 2.15 cfs each month of the year.

Example of Populated Infrastructure Costs

If capital costs would be incurred for an alternative, they would be documented here.

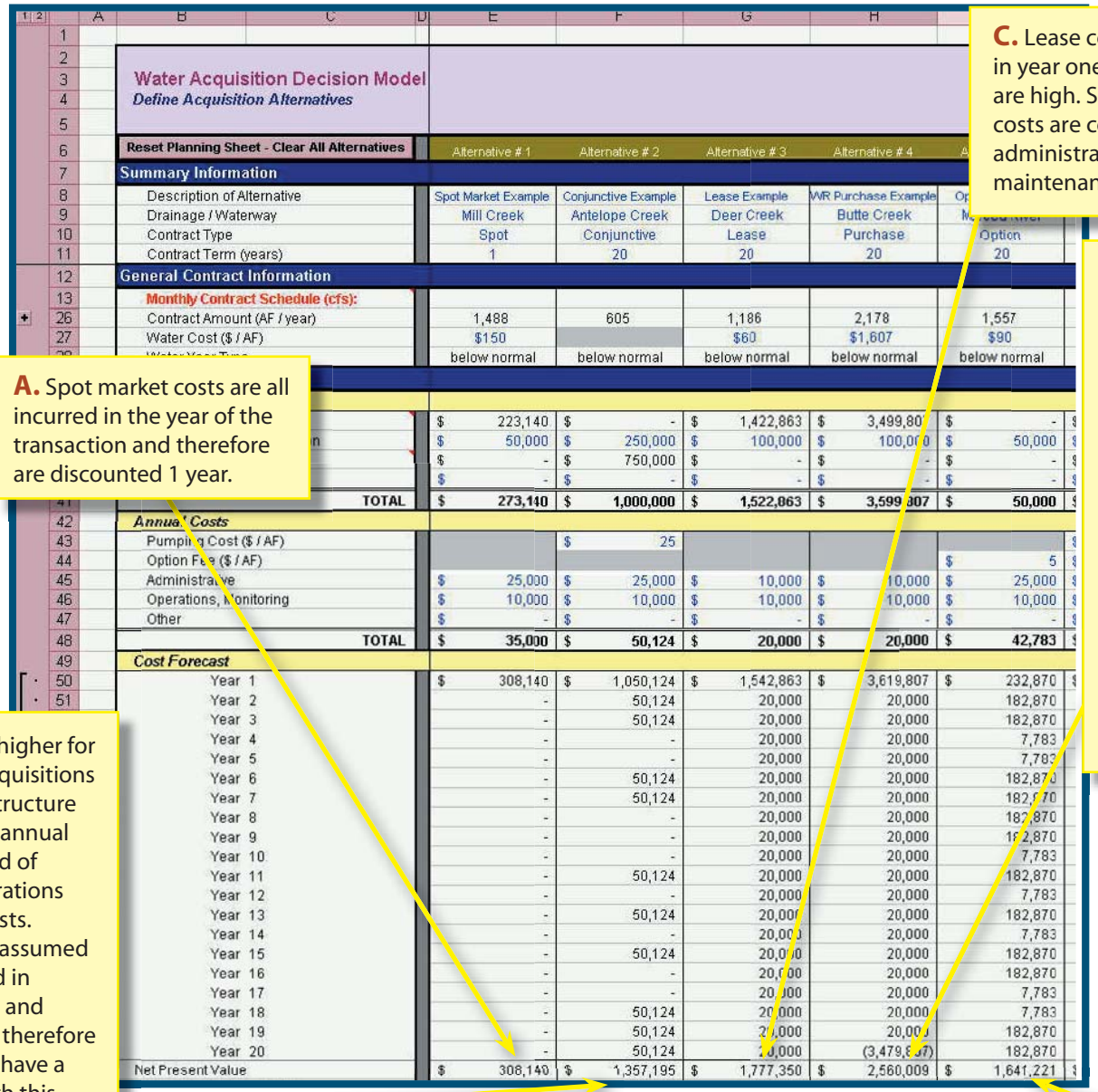


		Alternative # 1	Alternative # 2	Alternative # 3	Alternative # 4	Alternative # 5
Water Acquisition Decision Model *Define Acquisition Alternatives*						
Reset Planning Sheet - Clear All Alternatives						
Summary Information						
Description of Alternative		Spot Market Example	Conjunctive Example	Lease Example	WR Purchase Example	Options Example
Drainage / Waterway		Mill Creek	Antelope Creek	Deer Creek	Butte Creek	Merced River
Contract Type		Spot	Conjunctive	Lease	Purchase	Option
Contract Term (years)		1	20	20	20	20
General Contract Information						
Monthly Contract Schedule (cfs):						
Contract Amount (AF / year)		1,488	605	1,186	2,178	1,557
Water Cost ($ / AF)		$150		$60	$1,607	$90
Water Year Type		below normal	below normal	below normal	below normal	below normal
Cost						
Initial Costs						
Water		$ 223,140	$	$ 1,422,863	$ 3,499,807	$ -
Negotiation / Administration		$ 50,000	$ 250,000	$ 100,000	$ 100,000	$ 50,000
Pump Capacity per Well (AF per year)			1,250			
Capital Cost per Well			$ 750,000			
Number of Wells Needed		-	1			-
Infrastructure		$ -	$ 750,000	$ -	$ -	$ -
Other		$ -	$ -	$ -	$ -	$ -
TOTAL		**$ 273,140**	**$ 1,000,000**	**$ 1,522,863**	**$ 3,599,807**	**$ 50,000**
Annual Costs						

A. Conjunctive use alternatives are likely to incur well costs.

B. If capital costs, such as for conveyance, are needed for other types of acquisition, they would be input here.

Details of Net Present Value Calculation



Water Acquisition Decision Model
Define Acquisition Alternatives

Reset Planning Sheet - Clear All Alternatives	Alternative # 1	Alternative # 2	Alternative # 3	Alternative # 4	
Summary Information					
Description of Alternative	Spot Market Example	Conjunctive Example	Lease Example	WR Purchase Example	Op
Drainage / Waterway	Mill Creek	Antelope Creek	Deer Creek	Butte Creek	M
Contract Type	Spot	Conjunctive	Lease	Purchase	Option
Contract Term (years)	1	20	20	20	20
General Contract Information					
Monthly Contract Schedule (cfs):					
Contract Amount (AF / year)	1,488	605	1,186	2,178	1,557
Water Cost ($ / AF)	$150		$60	$1,607	$90
	below normal	below normal	below normal	below normal	below normal
	$ 223,140	$ -	$ 1,422,863	$ 3,499,80	$ -
n	$ 50,000	$ 250,000	$ 100,000	$ 100,00	$ 50,000
	$ -	$ 750,000	$ -	$ -	$ -
	$ -	$ -	$ -	$ -	$ -
TOTAL	$ 273,140	$ 1,000,000	$ 1,522,863	$ 3,599,807	$ 50,000
Annual Costs					
Pumping Cost ($ / AF)		$ 25			
Option Fee ($ / AF)					$ 5
Administrative	$ 25,000	$ 25,000	$ 10,000	$ 10,000	$ 25,000
Operations, Monitoring	$ 10,000	$ 10,000	$ 10,000	$ 10,000	$ 10,000
Other	$ -	$ -	$ -	$ -	$ -
TOTAL	$ 35,000	$ 50,124	$ 20,000	$ 20,000	$ 42,783
Cost Forecast					
Year 1	$ 308,140	$ 1,050,124	$ 1,542,863	$ 3,619,807	$ 232,870
Year 2	-	50,124	20,000	20,000	182,870
Year 3	-	50,124	20,000	20,000	182,870
Year 4	-	-	20,000	20,000	7,783
Year 5	-	-	20,000	20,000	7,783
Year 6	-	50,124	20,000	20,000	182,870
Year 7	-	50,124	20,000	20,000	182,870
Year 8	-	-	20,000	20,000	182,870
Year 9	-	-	20,000	20,000	182,870
Year 10	-	-	20,000	20,000	7,783
Year 11	-	50,124	20,000	20,000	182,870
Year 12	-	-	20,000	20,000	7,783
Year 13	-	50,124	20,000	20,000	182,870
Year 14	-	-	20,000	20,000	7,783
Year 15	-	50,124	20,000	20,000	182,870
Year 16	-	-	20,000	20,000	182,870
Year 17	-	-	20,000	20,000	7,783
Year 18	-	50,124	20,000	20,000	7,783
Year 19	-	50,124	20,000	20,000	182,870
Year 20	-	50,124	20,000	(3,479,807)	182,870
Net Present Value	$ 308,140	$ 1,357,195	$ 1,777,350	$ 2,560,009	$ 1,641,221

A. Spot market costs are all incurred in the year of the transaction and therefore are discounted 1 year.

B. Initial costs are higher for conjunctive use acquisitions if there is an infrastructure need. Subsequent annual costs are composed of pumping and operations and monitoring costs. Conjunctive use is assumed to be implemented in below normal, dry, and critically dry years, therefore not every year will have a cost associated with this type of alternative.

C. Lease contracts must be paid in year one, therefore initial costs are high. Subsequent annual costs are composed of recurring administrative and operations and maintenance costs.

D. Upfront and recurring costs for water rights purchases are similar to leases. An exception is the credit in year 20 for the purchase price of the water less the recurring costs in the 20th year. This represents the residual value of the water right, assuming it may be re-sold or put to another environmental use. Any water right purchased by the FWS represents real property, unlike contracts which end after a period. The residual value captures the benefit of real property and the flexibility of the FWS to use or sell this property.

E. For option contracts, initial costs are lower because water is paid for when the contract is exercised. In years where the option to purchase water is exercised (above normal, below normal, dry, and critically dry), water costs are higher. In years when water is not purchased, only the option fee is paid.

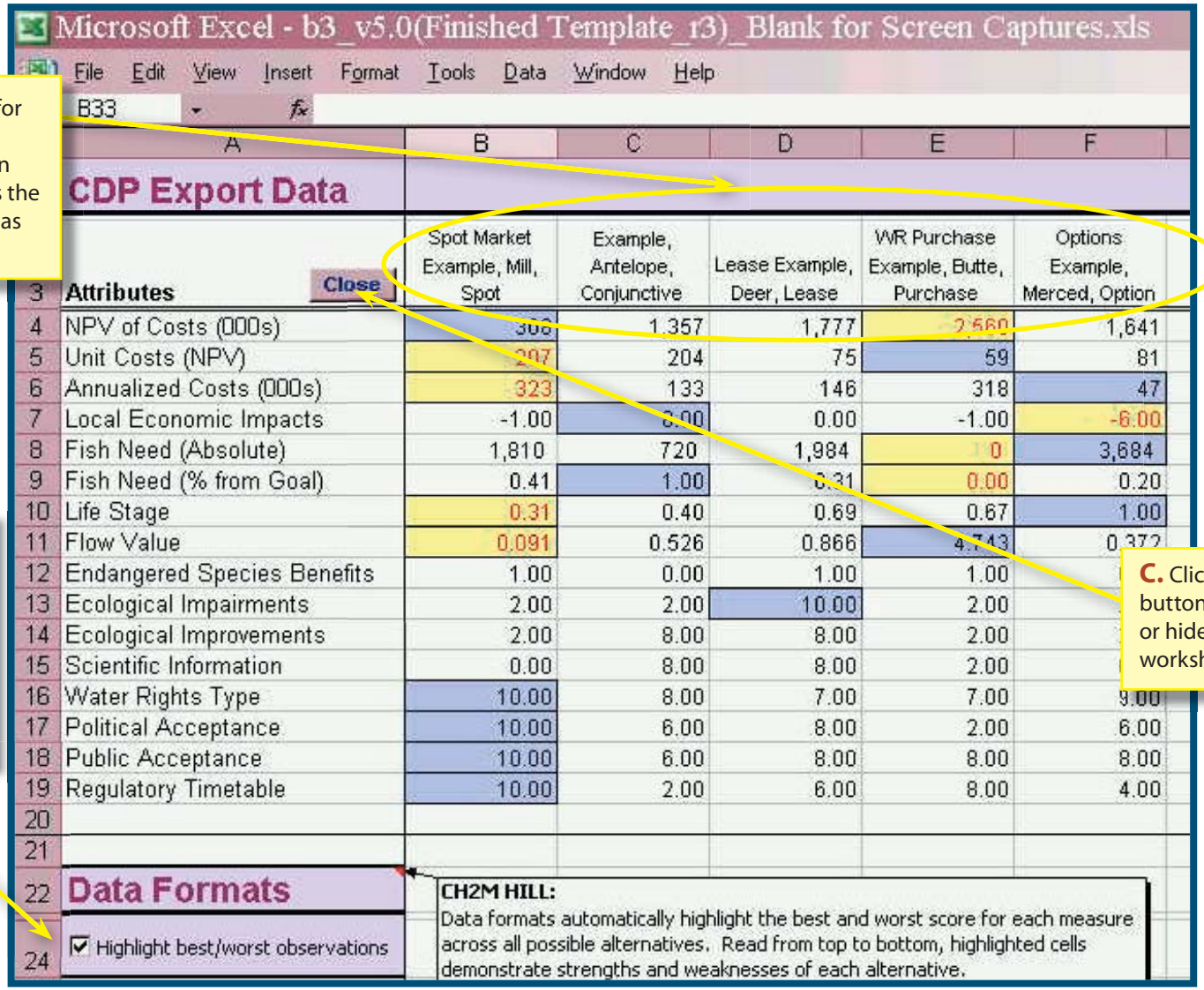
Hidden Worksheets

There are several worksheets that are hidden to keep the data input interface less cluttered. To unhide these sheets, use the "Reports" and "Navigation" buttons on the Assumptions worksheet of the DSM workbook. The user may also unhide the sheets from the Microsoft Excel menu bar by choosing "Format/Sheet/Unhide." The hidden sheets are:

- Export Data to CDP
- Instream Flow Targets for each drainage
- Wet, Above Normal, Below Normal, Dry, and Critically Dry water year base flows and flow deficits relative to the target flows for each drainage
- Assumed Water Year Sequences
- Flow Value Calculations for Alternatives 1 through 10
- Flow Value Calculations for Alternatives 11 through 20

CDP Export Data Worksheet

CDP Export Data worksheet is the sheet that formats the scores for each alternative for export into CDP, the decision science software.



A. Scores are shown for each alternative. The alternatives must be in the same order across the top of this worksheet as they are in CDP.

B. Check this box to see which alternatives have the highest and lowest scores for each scoring element. This highlights the strengths and weaknesses of the alternative.

C. Click this button to close or hide this worksheet.

Instream Target Flow—Below Normal Water Year

The instream target flow is based on the water acquisition priorities established in AFRP 1996 for Chinook and other anadromous fishes. Given a drainage, water year type, and priority level, ECOSIM produces feasible target flows in accordance with the Central Valley Project and State Water Project Coordinated Operations Agreement and in compliance with Bay-Delta Accord standards and CVPIA (b)(2) criteria. The specific target flows will be output by ECOSIM and the DSM user must coordinate with the ECOSIM modeler to receive this output. The specific target flows must be input into the Instream Target Flow table manually.

Below is a table of target flows for the Below Normal water year. These target flows may be used as default flow targets to run the DSM for generalized rankings of alternatives. The Below Normal water year was chosen because it is a year type in which obtaining additional flows becomes increasingly beneficial for anadromous fishes. The interpretation of the rankings would be limited to the Below Normal water year and the assumptions documented in the Notes and References column. Generalized rankings are useful for strategic planning purposes with respect to water acquisition and budgeting.

A. Clicking this button closes this worksheet.

B. Assumptions pertaining to the instream target flows.

Close | Recommended Instream Target Flow (for a Water Year in TAF) | RESTORE Default Targets | CLEAR Default Flow Targets

Drainage	Race	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Notes and References
Antelope Creek	SRC	-	-	-	-	-	1.6	3.0	3.1	1.5	-	-	-	Flow targets set by Andy Hamilton/Dick Jewell USFWS - June 25, 2002
Battle Creek [1,2]	SRC	-	-	-	-	-	-	-	-	-	-			No targets set. Diversion alteration is plan here.
Bear River	FRC	13.5	13.1	13.5	14.5	13.3				3.6	3.7			, through priority 6.
Big Chico Creek [1]	FRC	-	-	-	-	-				-	-			ily limited by flows. No acquisition flow potential. Targets = zero.)
Butte Creek [2]	SRC	6.2	6.0	6.2	6.2	5.6				6.0	-			set by Andy Hamilton/Dick Jewell USFWS - June 25, 2002
Calaveras River	WRC	9.1	4.2	4.4	4.4	10.4				11.7	12.1			, through priority 11.
Clear Creek [1,2]	FRC	-	-	-	-	-				-	-			resolution
Cosumnes River	FRC	9.2	8.9	9.2	-	-	-	59.5	61.5	-	-			ys. Flows can be obtained only through reduced GW pumping (unlikely).
Cottonwood Creek [1]	FRC	-	-	-	-	-	-	-	-	-	-			ily limited by flows. No acquisition flow potential. Targets = zero.)
Cow Creek	FRC	3.1	-	-	-	-	1.6	3.0	3.1	1.5	-			set by Andy Hamilton/Dick Jewell USFWS - June 25, 2002
Deer Creek	SRC	-	-	-	-	-	-	-	9.8	9.5	-			set by Andy Hamilton/Dick Jewell USFWS - June 25, 2002
Feather River [2]	FRC	153.8	148.8	153.8	153.8	138.8	153.8	148.8	153.8	65.5	67.7			nal year ECOSIM input.
Merced River	FRC	17.1	25.1	25.9	18.6	16.8	18.6	47.8	49.4	15.4	15.9			w Normal year ECOSIM input.
Mill Creek	SRC	-	-	-	-	-	-	9.3	9.7	9.3	-	-	-	Flow targets set by Andy Hamilton/Dick Jewell USFWS - June 25, 2002
Mokelumne River [2]	FRC	18.3	19.5	20.1	18.0	16.3	18.0	26.0	23.2	16.3	6.6	6.6	6.4	Level 4. Below Normal year ECOSIM input.
Stanislaus River	FRC	12.3	17.3	17.8	48.0	43.3	48.0	102.9	106.4	35.7	37.5	38.7	35.7	Level 3. Below Normal year ECOSIM input.
Tuolumne River	FRC	25.8	26.2	27.1	18.5	16.7	18.5	70.8	84.3	14.9	15.4	15.4	14.9	Level 5. Below Normal year ECOSIM input.
Yuba River	FRC	30.7	29.7	30.7	30.9	27.9	30.9	49.3	50.9	36.7	27.0	27.0	26.1	Level 4. Below Normal year ECOSIM input.

[1] *No flow targets established by AFRP or USFWS*

[2] *These streams appear to have met their doubling goal. Enter a "0" for Target Flow to indicate there is no flow value for anadromous fish, if desired.*

C. Clicking this button restores the default values.

D. Clicking this button clears the pre-populated targets, clearing the worksheet to be populated with specific flow targets.

E. These drainages do not have AFRP or FWS established target flows.

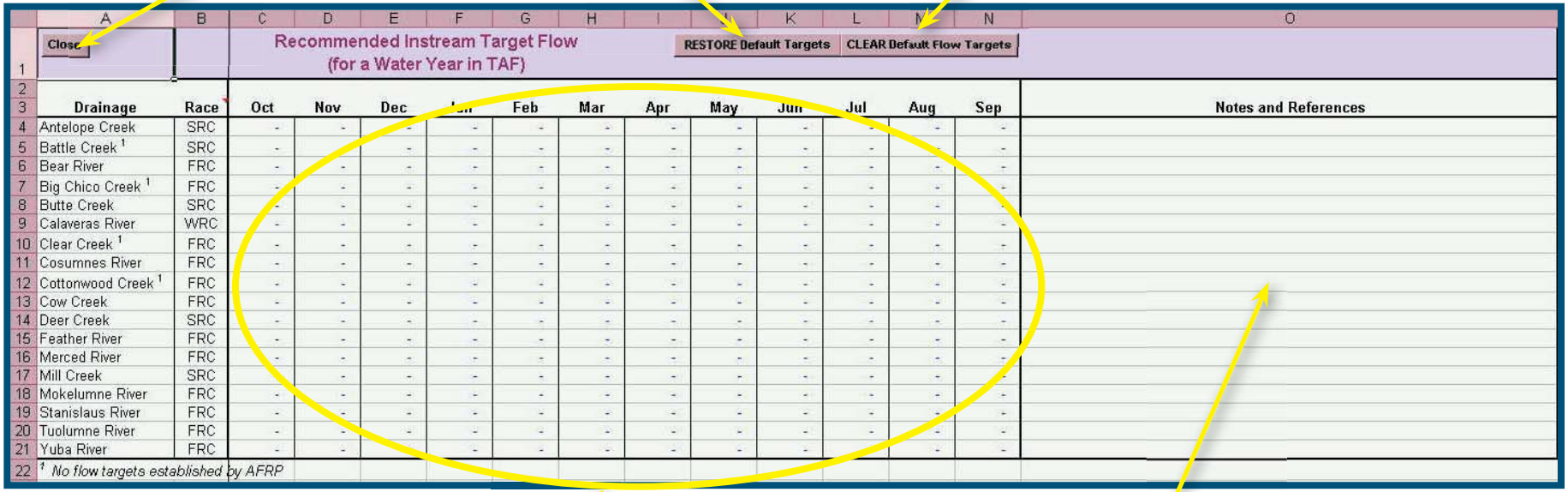
F. These drainages appear to have met their AFRP doubling goal, according to the April 2004 GrandTab data. Water acquired for these systems would not have flow value for Chinook salmon, but would benefit other species and habitat overall. To model "0" flow value for any drainage, input Target Flow as a "0"

Instream Target Flow—Specific Values

A. Clicking this button closes this worksheet.

B. Clicking this button restores the default values.

C. Clicking this button clears the pre-populated values and the table looks as it does in this figure.



Close

Recommended Instream Target Flow
(for a Water Year in TAF)

RESTORE Default Targets | CLEAR Default Flow Targets

Drainage	Race	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Notes and References
Antelope Creek	SRC	-	-	-	-	-	-	-	-	-	-	-	-	
Battle Creek [1]	SRC	-	-	-	-	-	-	-	-	-	-	-	-	
Bear River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Big Chico Creek [1]	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Butte Creek	SRC	-	-	-	-	-	-	-	-	-	-	-	-	
Calaveras River	WRC	-	-	-	-	-	-	-	-	-	-	-	-	
Clear Creek [1]	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Cosumnes River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Cottonwood Creek [1]	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Cow Creek	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Deer Creek	SRC	-	-	-	-	-	-	-	-	-	-	-	-	
Feather River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Merced River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Mill Creek	SRC	-	-	-	-	-	-	-	-	-	-	-	-	
Mokelumne River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Stanislaus River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Tuolumne River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	
Yuba River	FRC	-	-	-	-	-	-	-	-	-	-	-	-	

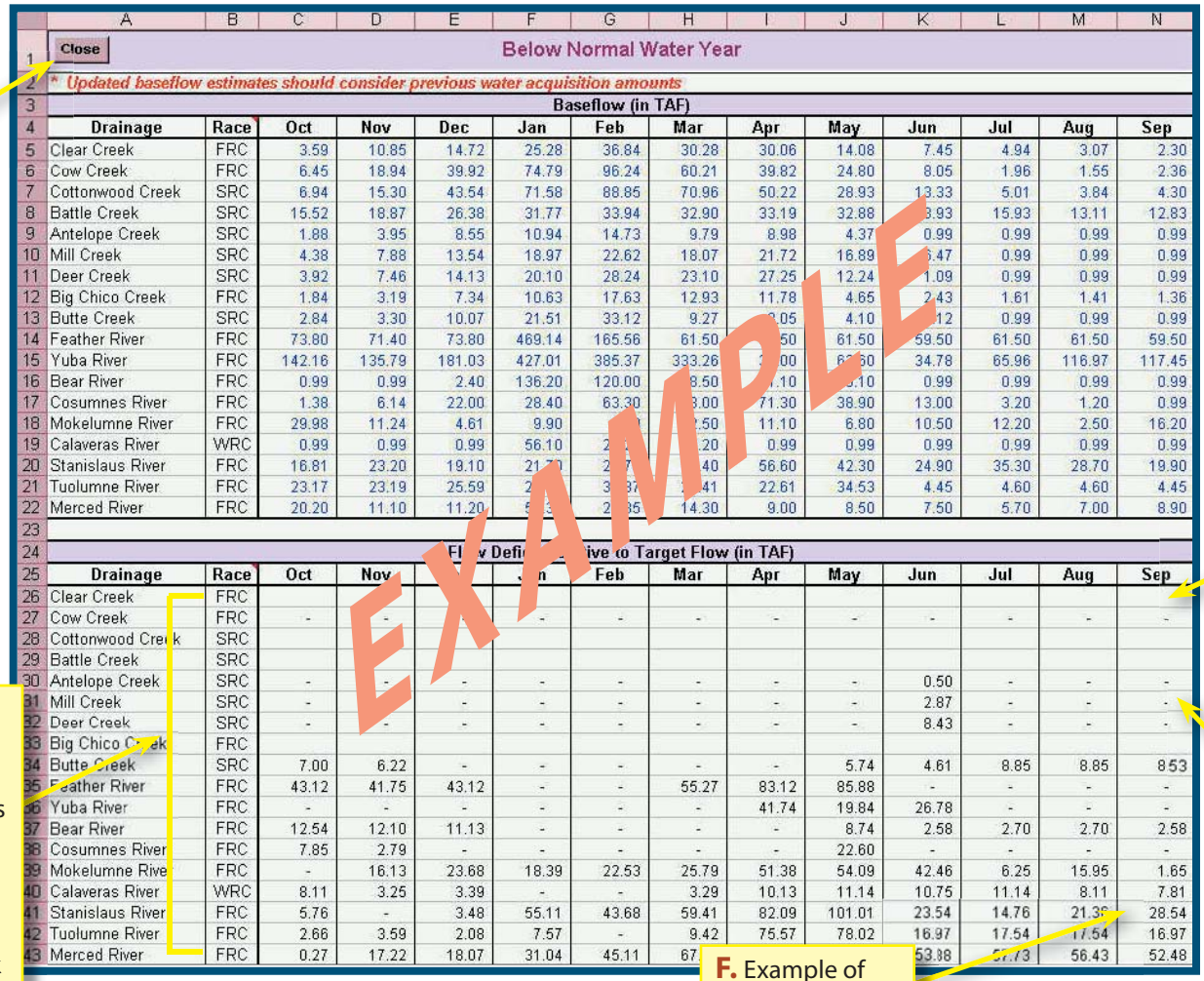
[1] *No flow targets established by AFRP*

D. Enter the target flow values from ECOSIM for a specific scenario based on water year type, drainages, and acquisition priorities from AFRP 1996.

E. Document water year type and AFRP priorities.

Base Flows and Flow Deficits

Base flow levels should remain fairly constant across DSM runs, but may change due to system operations, long-term WAP leases, or water rights purchases. Flow deficits are calculated as the difference between target flows and base flows. Before the DSM is run, the user should confirm that the base flow and flow deficit data are current.



Close

Below Normal Water Year

* Updated baseflow estimates should consider previous water acquisition amounts

Baseflow (in TAF)

Drainage	Race	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Clear Creek	FRC	3.59	10.85	14.72	25.28	36.84	30.28	30.06	14.08	7.45	4.94	3.07	2.30
Cow Creek	FRC	6.45	18.94	39.92	74.79	96.24	60.21	39.82	24.80	8.05	1.96	1.55	2.36
Cottonwood Creek	SRC	6.94	15.30	43.54	71.58	88.85	70.96	50.22	28.93	13.33	5.01	3.84	4.30
Battle Creek	SRC	15.52	18.87	26.38	31.77	33.94	32.90	33.19	32.88	3.93	15.93	13.11	12.83
Antelope Creek	SRC	1.88	3.95	8.55	10.94	14.73	9.79	8.98	4.37	0.99	0.99	0.99	0.99
Mill Creek	SRC	4.38	7.88	13.54	18.97	22.62	18.07	21.72	16.89	6.47	0.99	0.99	0.99
Deer Creek	SRC	3.92	7.46	14.13	20.10	28.24	23.10	27.25	12.24	1.09	0.99	0.99	0.99
Big Chico Creek	FRC	1.84	3.19	7.34	10.63	17.63	12.93	11.78	4.65	2.43	1.61	1.41	1.36
Butte Creek	SRC	2.84	3.30	10.07	21.51	33.12	9.27	3.05	4.10	1.12	0.99	0.99	0.99
Feather River	FRC	73.80	71.40	73.80	469.14	165.56	61.50	61.50	61.50	59.50	61.50	61.50	59.50
Yuba River	FRC	142.16	135.79	181.03	427.01	385.37	333.26	3.00	6.60	34.78	65.96	116.97	117.45
Bear River	FRC	0.99	0.99	2.40	136.20	120.00	8.50	5.10	5.10	0.99	0.99	0.99	0.99
Cosumnes River	FRC	1.38	6.14	22.00	28.40	63.30	3.00	71.30	38.90	13.00	3.20	1.20	0.99
Mokelumne River	FRC	29.98	11.24	4.61	9.90		2.50	11.10	6.80	10.50	12.20	2.50	16.20
Calaveras River	WRC	0.99	0.99	0.99	56.10	2	1.20	0.99	0.99	0.99	0.99	0.99	0.99
Stanislaus River	FRC	16.81	23.20	19.10	21.70	2.7	1.40	56.60	42.30	24.90	35.30	28.70	19.90
Tuolumne River	FRC	23.17	23.19	25.59	2	3.37	1.41	22.61	34.53	4.45	4.60	4.60	4.45
Merced River	FRC	20.20	11.10	11.20	5	2.35	14.30	9.00	8.50	7.50	5.70	7.00	8.90

Flow Deficit Relative to Target Flow (in TAF)

Drainage	Race	Oct	Nov			Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Clear Creek	FRC												
Cow Creek	FRC	-	-	-	-	-	-	-	-	-	-	-	-
Cottonwood Creek	SRC												
Battle Creek	SRC												
Antelope Creek	SRC	-	-	-	-	-	-	-	-	0.50	-	-	-
Mill Creek	SRC	-	-	-	-	-	-	-	-	2.87	-	-	-
Deer Creek	SRC	-	-	-	-	-	-	-	-	8.43	-	-	-
Big Chico Creek	FRC												
Butte Creek	SRC	7.00	6.22	-	-	-	-	-	5.74	4.61	8.85	8.85	8.53
Feather River	FRC	43.12	41.75	43.12	-	-	55.27	83.12	85.88	-	-	-	-
Yuba River	FRC	-	-	-	-	-	-	41.74	19.84	26.78	-	-	-
Bear River	FRC	12.54	12.10	11.13	-	-	-	-	8.74	2.58	2.70	2.70	2.58
Cosumnes River	FRC	7.85	2.79	-	-	-	-	-	22.60	-	-	-	-
Mokelumne River	FRC	-	16.13	23.68	18.39	22.53	25.79	51.38	54.09	42.46	6.25	15.95	1.65
Calaveras River	WRC	8.11	3.25	3.39	-	-	3.29	10.13	11.14	10.75	11.14	8.11	7.81
Stanislaus River	FRC	5.76	-	3.48	55.11	43.68	59.41	82.09	101.01	23.54	14.76	21.39	28.54
Tuolumne River	FRC	2.66	3.59	2.08	7.57	-	9.42	75.57	78.02	16.97	17.54	17.54	16.97
Merced River	FRC	0.27	17.22	18.07	31.04	45.11	67		53.88			56.43	52.48

EXAMPLE

A. Click this button to close or hide this worksheet.

B. This indicates the Chinook race for which the target flows are established. Normally, it is the most limiting race in the drainage.
FRC=fall run Chinook
SRC=spring run Chinook
WRC=winter run Chinook

C. Monthly base flow for each drainage for a typical Below Normal water year.

D. A blank cell indicates no flow targets were established for a particular drainage.

E. The "–" symbol indicates there is no flow deficit. That is, baseflow is equal to or exceeds target

F. Example of flow deficits

Detailed Flow Value Calculations

The Flow Value score is calculated based on the size of the proposed acquisition, target flow, and base flow. The calculations are made automatically based on data input by the user. Note that rows have been hidden in the graphic in order to show all the components of flow value on one page.

A. Click this button to close or hide this worksheet.

B. The proposed acquisition volume is shown in cfs and AF. The flow value is based on AF of water. The flow value is calculated based on addressing some portion or the entire flow deficit. If water is not taken because there is no flow deficit in that month or if the proposed acquisition does not provide water in that month, then there is no contribution to the flow value.

C. Target flow data is based on AFRP (1996) and Jewell and Hamilton (2002).

D. Base flow is grounded in ECOSIM data.

E. Flow value of a proposed acquisition.

Close

Alternative # 1

Mill Creek , Spot

Proposed Acquistion (AF)

CFS:	-	-	-	-	-	-	-	-	-	25.00	-	-	-	25.00
Year	Water Taken?	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1	Yes	-	-	-	-	-	-	-	-	1,488	-	-	-	1,488
2	No	-	-	-	-	-	-	-	-	0	-	-	-	0
3	No	-	-	-	-	-	-	-	-	0	-	-	-	0
4	No	-	-	-	-	-	-	-	-	0	-	-	-	0
5	No	-	-	-	-	-	-	-	-	0	-	-	-	0
6	No	-	-	-	-	-	-	-	-	0	-	-	-	0
7	No	-	-	-	-	-	-	-	-	0	-	-	-	0
8	No	-	-	-	-	-	-	-	-	0	-	-	-	0
9	No	-	-	-	-	-	-	-	-	0	-	-	-	0
10	No	-	-	-	-	-	-	-	-	0	-	-	-	0
11	No	-	-	-	-	-	-	-	-	0	-	-	-	0
12	No	-	-	-	-	-	-	-	-	0	-	-	-	0
13	No	-	-	-	-	-	-	-	-	0	-	-	-	0
14	No	-	-	-	-	-	-	-	-	0	-	-	-	0
15	No	-	-	-	-	-	-	-	-	0	-	-	-	0
16	No	-	-	-	-	-	-	-	-	0	-	-	-	0
17	No	-	-	-	-	-	-	-	-	0	-	-	-	0
18	No	-	-	-	-	-	-	-	-	0	-	-	-	0
19	No	-	-	-	-	-	-	-	-	0	-	-	-	0
20	No	-	-	-	-	-	-	-	-	0	-	-	-	0
														1,488

Target Flow (AF)

Year	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
1	below normal	-	-	-	-	-	-	-	-	9,342	-	-	-	
2	critically dry	-	-	-	-	-	-	-	-	9,342	-	-	-	
3	dry	-	-	-	-	-	-	-	-	9,342	-	-	-	
19	critically dry	-	-	-	-	-	-	-	-	9,342	-	-	-	
20	critically dry	-	-	-	-	-	-	-	-	9,342	-	-	-	

Estimated Base Flow (AF)

Year	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
1	below normal	-	-	-	-	-	-	-	-	6,468	-	-	-	
2	critically dry	-	-	-	-	-	-	-	-	990	-	-	-	
3	dry	-	-	-	-	-	-	-	-	2,779	-	-	-	
19	critically dry	-	-	-	-	-	-	-	-	990	-	-	-	
20	critically dry	-	-	-	-	-	-	-	-	990	-	-	-	

Flow Value

Year	Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1	below normal	-	-	-	-	-	-	-	-	0.091	-	-	-	0.091
2	critically dry	-	-	-	-	-	-	-	-	0.000	-	-	-	0.000
3	dry	-	-	-	-	-	-	-	-	0.000	-	-	-	0.000
18	dry	-	-	-	-	-	-	-	-	0.000	-	-	-	0.000
19	critically dry	-	-	-	-	-	-	-	-	0.000	-	-	-	0.000
20	critically dry	-	-	-	-	-	-	-	-	0.000	-	-	-	0.000
														0.091

Water Year Sequences

Water year sequences were assumed based on the historic records for the American River, Sacramento River, and San Joaquin River watersheds. These sequences, in conjunction with assumptions of which types of acquisitions were eligible in each water year type (see NPV discussion on page 30) determine the NPV of costs. Costs that are farther in the future are discounted more, that is they are worth less in today's dollars. On the other hand, costs that are closer to the present are worth more relative to today. For example, if the distribution of water years were ordered from wet to critically dry, the higher costs of buying more water in the critically dry years would be discounted more. If the water years were ordered from critically dry to wet, the drier year water costs are discounted less. Both cases skew the NPV calculations. By assuming an unordered sequence, the NPV of costs is more representative of reality.

The water year sequences may be updated as the historic record becomes longer and as new information becomes available through applying the DSM. All changes should be justified and documented.

A. Click this button to close or hide this worksheet.

B. The assumed sequences change slightly based on the starting year, though the distribution of water years is the same.

C. The corresponding sequence is chosen by the DSM based on the starting water year type input by the user.

Close

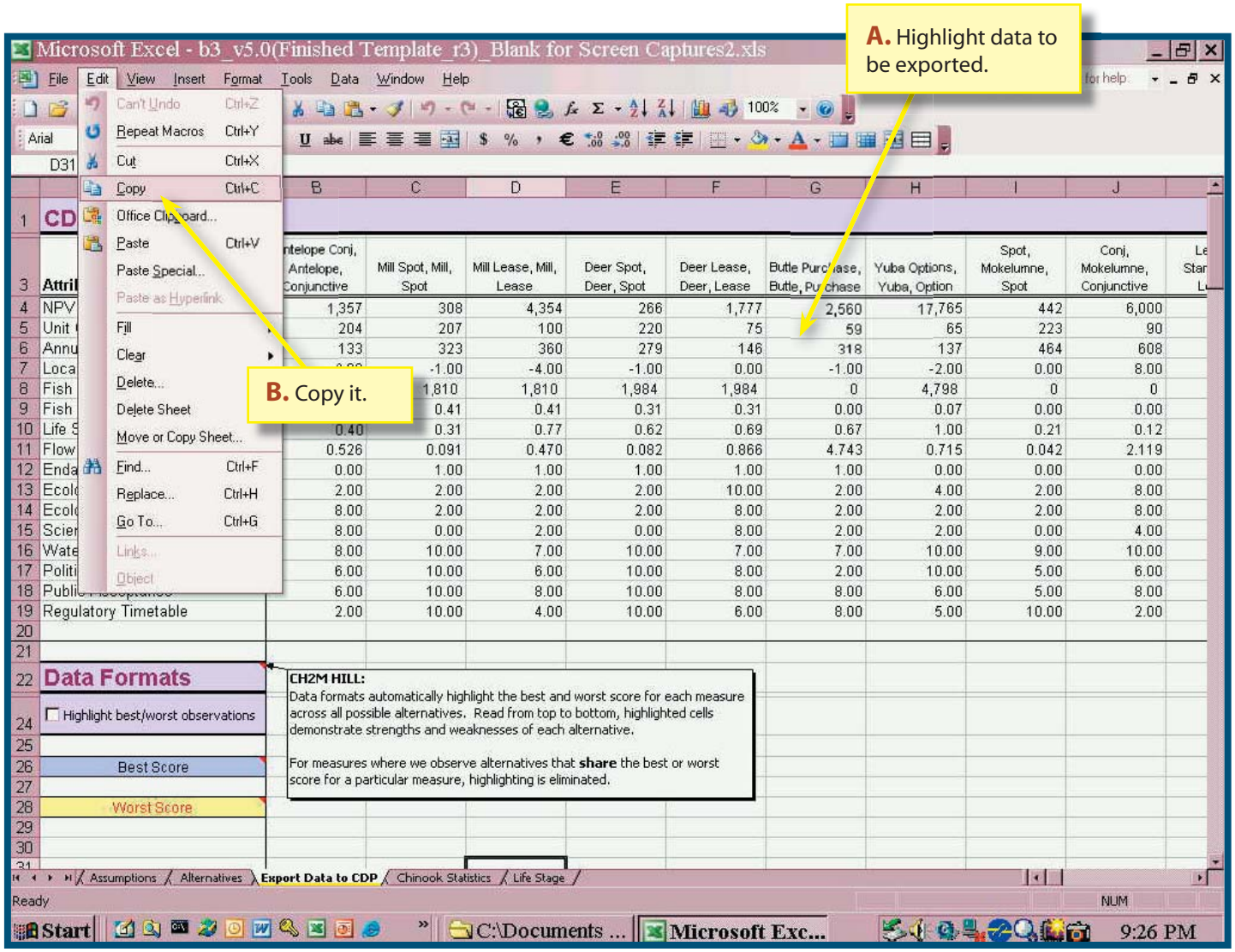
Water Acquisition Decision Model

Assumed Water Year Sequence by Drainage

Drainage	Waterway	Year	Wet	Above Normal	Below Normal	Dry	Critically Dry	Assumed
American R.	Clear Creek	1	wet	above normal	below normal	dry	critically dry	**below normal**
	Cow Creek	2	above normal	wet	critically dry	critically dry	dry	**critically dry**
	Cottonwood Creek	3	below normal	below normal	dry	below normal	below normal	**dry**
	Battle Creek	4	critically dry	critically dry	above normal	above normal	above normal	**above normal**
	Antelope Creek	5	dry	dry	wet	wet	wet	**wet**
	Mill Creek	6	below normal	below normal	below normal	below normal	below normal	**below normal**
	Deer Creek	7	below normal	below normal	below normal	below normal	below normal	**below normal**
	Big Chico Creek	8	above normal	above normal	above normal	above normal	above normal	**above normal**
	Butte Creek	9	wet	wet	wet	wet	wet	**wet**
	Feather River	10	wet	wet	wet	wet	wet	**wet**
	Yuba River	11	dry	dry	dry	dry	dry	**dry**
	Bear River	12	wet	wet	wet	wet	wet	**wet**

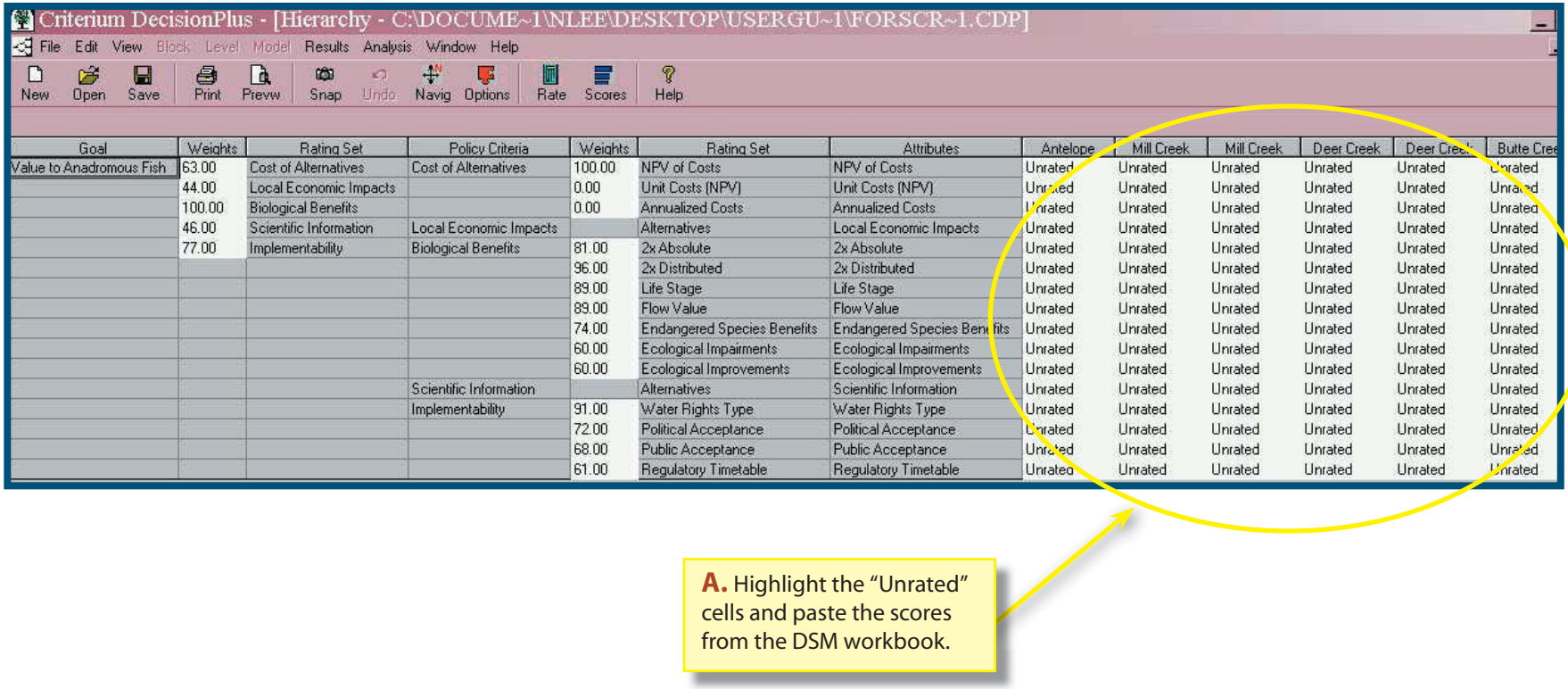
Exporting Scores to CDP

Once the DSM workbook has been populated with scores for each alternative, the scores must be exported into CDP. To do so, return to the Assumptions tab of the DSM workbook and click on the Generate CDP Export Summary button. From the Export Summary, highlight the cells containing the data that need to be exported and then copy it.



Pasting Scores in CDP

Return to the CDP file that contains the water acquisition alternatives. From the menu bar on the model Hierarchy screen, choose "View/Hierarchy Data." This brings up a table with the model structure, policy criteria, scoring element weights, and the alternatives with "Unrated" scores. Highlight all the "Unrated" cells and paste the scores from the DSM workbook.



Goal	Weights	Rating Set	Policy Criteria	Weights	Rating Set	Attributes	Antelope	Mill Creek	Mill Creek	Deer Creek	Deer Creek	Butte Cree
Value to Anadromous Fish	63.00	Cost of Alternatives	Cost of Alternatives	100.00	NPV of Costs	NPV of Costs	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
	44.00	Local Economic Impacts		0.00	Unit Costs (NPV)	Unit Costs (NPV)	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
	100.00	Biological Benefits		0.00	Annualized Costs	Annualized Costs	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
	46.00	Scientific Information	Local Economic Impacts		Alternatives	Local Economic Impacts	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
	77.00	Implementability	Biological Benefits	81.00	2x Absolute	2x Absolute	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				96.00	2x Distributed	2x Distributed	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				89.00	Life Stage	Life Stage	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				89.00	Flow Value	Flow Value	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				74.00	Endangered Species Benefits	Endangered Species Benefits	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				60.00	Ecological Impairments	Ecological Impairments	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				60.00	Ecological Improvements	Ecological Improvements	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
			Scientific Information		Alternatives	Scientific Information	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
			Implementability	91.00	Water Rights Type	Water Rights Type	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				72.00	Political Acceptance	Political Acceptance	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				68.00	Public Acceptance	Public Acceptance	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated
				61.00	Regulatory Timetable	Regulatory Timetable	Unrated	Unrated	Unrated	Unrated	Unrated	Unrated

Out of Range Errors

If a dialogue window appears indicating a "Value out of range error," cancel the Paste operation by clicking the cancel button and then check to see if there has been a data entry mistake in the DSM workbook. If there is no data entry mistake, consider how far out of range the score is. If it is slightly out of range, by no more than 10 percent, consider truncating the value to the maximum score for that scoring element and running the DSM as usual.

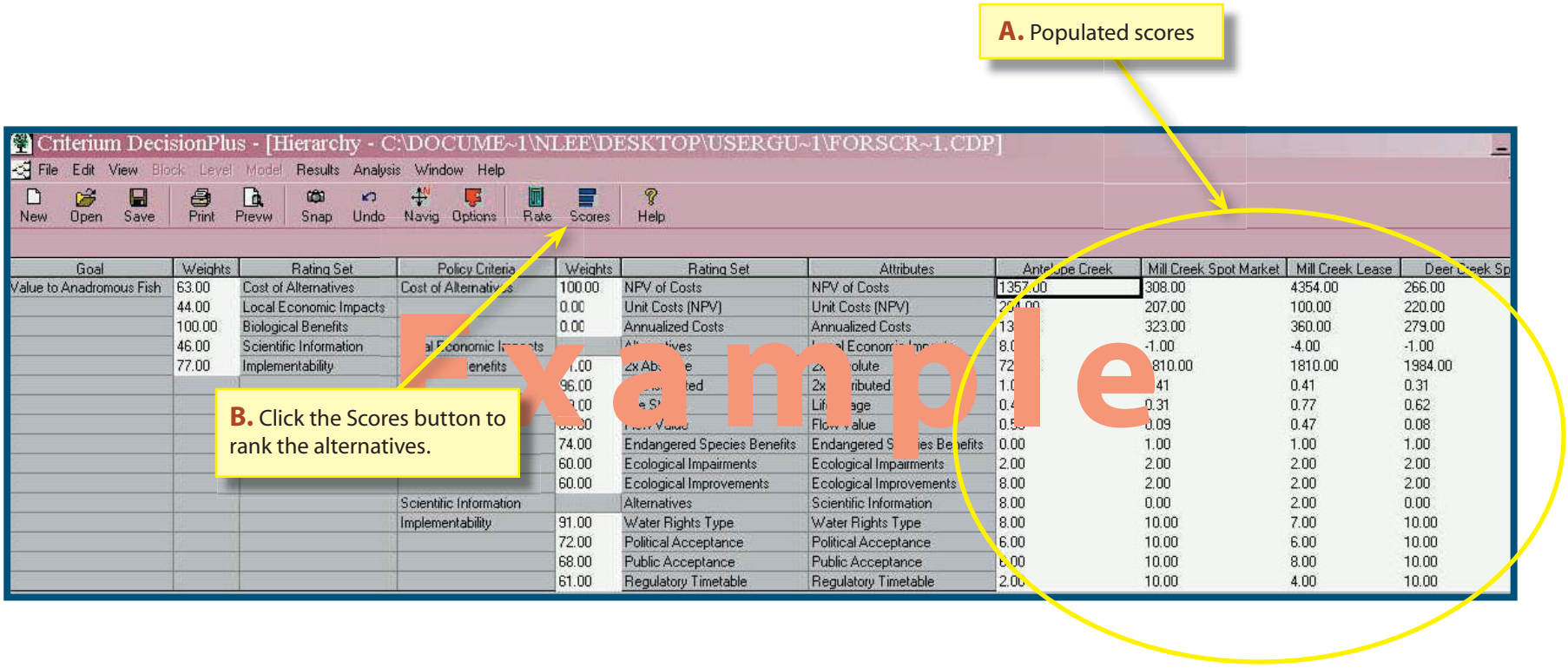
If the score is out of range by more than 10% or if more than one score is out of range, consider omitting the alternative from the group of acquisitions under consideration. There is something unique about this alternative and comparing it to the others would not be appropriate. This alternative should still be considered for acquisition by the FWS, but do so outside of the DSM. The scoring elements most likely to have scores out of range are NPV of Costs, Unit Costs, Annualized Costs, and Flow Value.

The ranges of possible scores for the scoring elements should not be modified simply to accommodate an out of range alternative because doing so changes the assumptions of the DSM. The allowable range for each scoring element's possible scores was developed assuming typical water acquisition characteristics in terms of amount of water available, water prices, and temporal availability of the water. As more potential water acquisitions are considered, the DSM user may find that the characteristics of a typical alternative require the range of scores to be adjusted. Alternatively, another version of the DSM may be created to accommodate a particular kind of alternative (e.g., water rights purchases, a watershed, etc).

Justified changes in the range of scores should be documented so that rankings from the previous version are not compared to the new version and vice versa.

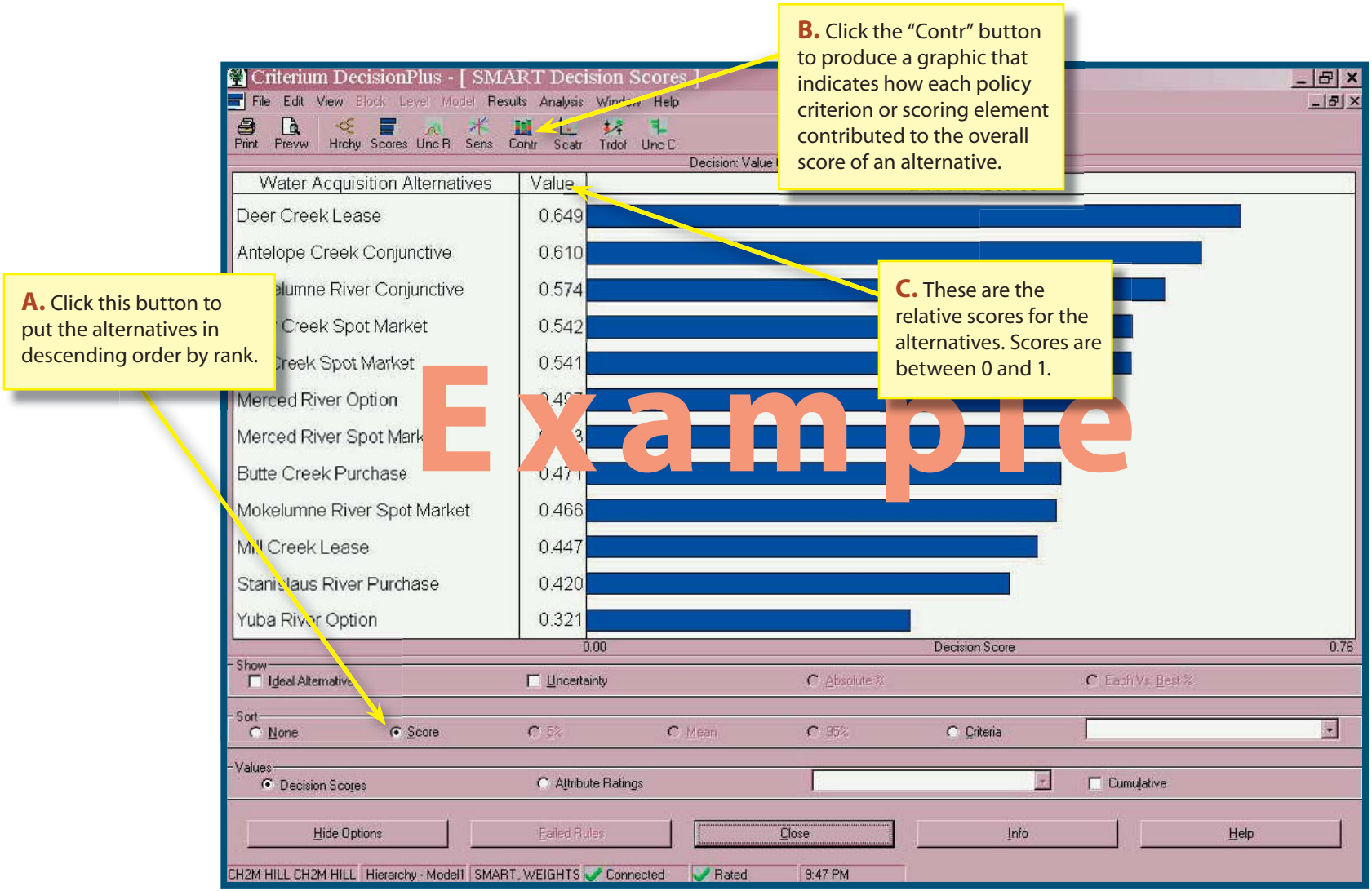
CDP Populated with Scores

Once CDP has been populated with the scores, click the "Scores" button from the row of icons above the scores to rank the alternatives.



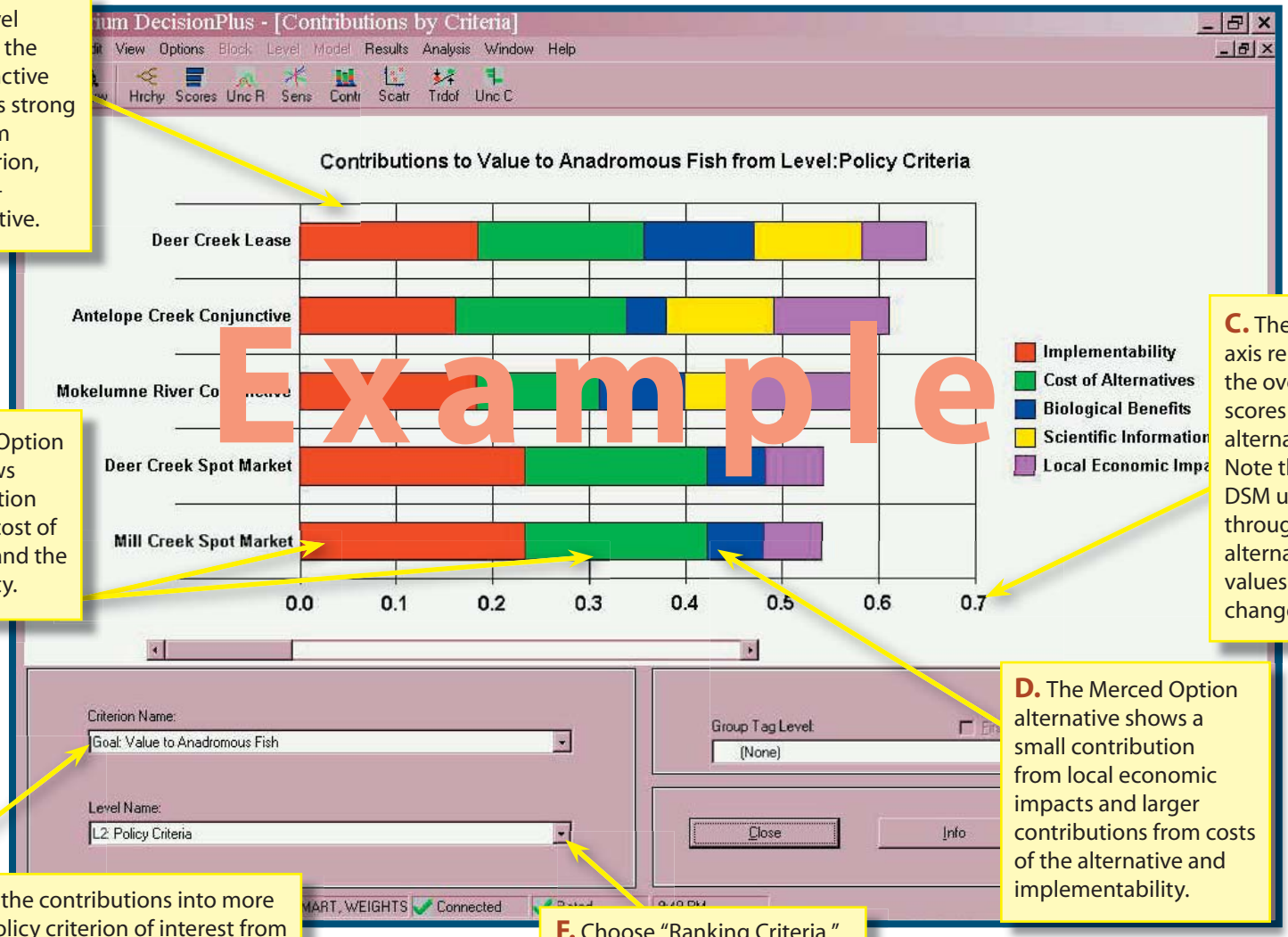
Ranked Alternatives

CDP displays the ranked alternatives in the order in which they are displayed in the model Hierarchy. To show the rankings in descending order, click the Score button in the Sort taskbar.



Contributions by Policy Criteria

The contributions graphics can be displayed as vertical (default) or horizontal bars. To display as horizontal, from the menu bar choose "View/Graph Style/Stacked Horizontal Bar." From the contributions graph, the DSM user can see how each policy criterion contributes to the overall score of an alternative.



A. The policy level contributions for the Antelope Conjunctive alternative shows strong contribution from each policy criterion, indicating a well-balanced alternative.

B. The Merced Option alternative shows strong contribution in terms of the cost of the alternative and the implementability.

C. The horizontal axis represents the overall scores for the alternatives. Note that as the DSM user scrolls through the alternatives, the values on the axis change.

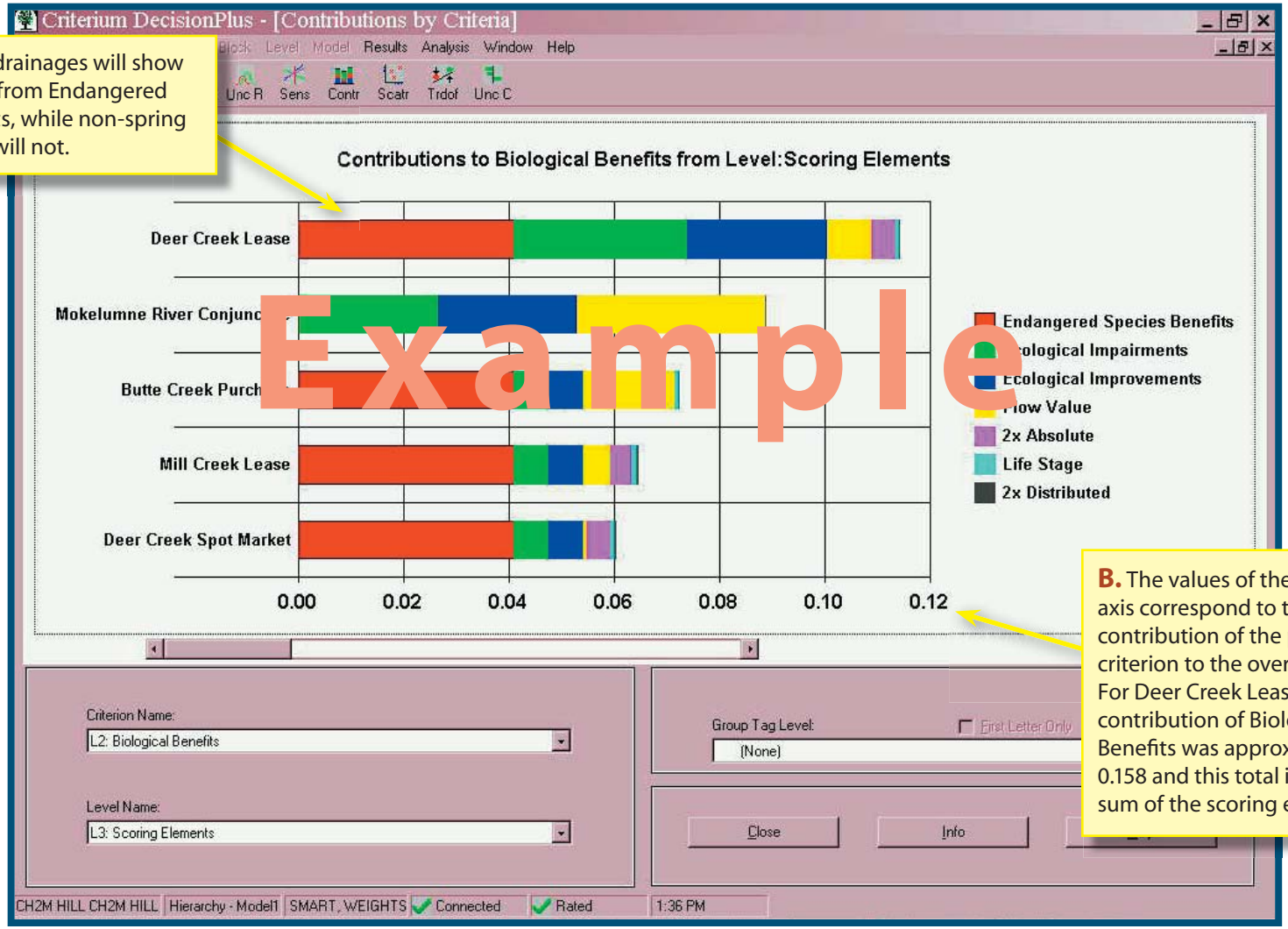
D. The Merced Option alternative shows a small contribution from local economic impacts and larger contributions from costs of the alternative and implementability.

E. To break down the contributions into more detail, choose a policy criterion of interest from this pull down menu.

F. Choose "Ranking Criteria."

Contributions by Scoring Elements

This screen shows a breakdown of how a set of scoring elements influences the contribution of the parent policy criterion.



A. Spring run drainages will show a contribution from Endangered Species Benefits, while non-spring run drainages will not.

B. The values of the horizontal axis correspond to the contribution of the policy criterion to the overall score. For Deer Creek Lease, the contribution of Biological Benefits was approximately 0.158 and this total is shown as a sum of the scoring elements.

Works Cited

InfoHarvest, Inc. 1999. Criterion DecisionPlus User's Guide, Version 3.0.

Jewell, Dick and Andy Hamilton. 2002. Staff Report on Environmental Water Needs. U.S. Fish and Wildlife Service. June 25.

U.S. Fish and Wildlife Service/Anadromous Fish Restoration Program (FWS/AFRP). 1996. "Draft Guidelines for Allocation of Water Acquired Pursuant to Section 3406(b)(3) of the Central Valley Project Improvement Act." October 22.

FWS/AFRP. 1995. "Working Paper on Restoration Needs. Habitat Restoration Actions to Double Natural Production of Anadromous Fish in the Central Valley of California." May 9.

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