YSF MOST PROMISING ACTIONS COMPILATION

THIS DOCUMENT IS A COMPILATION OF THE “MOST PROMISING ACTIONS” IDENTIFIED INDEPENDENTLY BY THE THREE YSF CAUCUSES FOR PURPOSES OF DISCUSSION IN THE YSF PLENARY.

THE WATER CAUCUS AND AGENCY CAUCUS EACH PREPARED SINGLE DOCUMENTS; THE CONSERVATION CAUCUS PREPARED THREE DOCUMENTS.

THE AGENCY CAUCUS MEMBERS AGREED TO PROVIDE THEIR INDIVIDUAL RATIONALES DURING THE YSF PLENARY MEETING DISCUSSION, AND NO RATIONALE APPEARS IN THIS DOCUMENT.
WATER CAUCUS
Yuba Salmon Forum

Water Caucus Identification of Most-Promising and Preferred Salmon Enhancement Actions

Introduction

The Yuba Salmon Forum charter (April 2011) states that… "The purpose of the Forum is to identify, evaluate, recommend and seek to achieve implementation of effective near-term and long-term actions to achieve viable salmonid populations in the Yuba River watershed to contribute to recovery goals, while also considering other beneficial uses of water resources and habitat values in neighboring watersheds, as part of Central Valley salmonid recovery actions." This document sets forth information from the Forum’s Water Caucus on most-promising and preferred salmon enhancement actions in the Yuba River Watershed.

Purposes of this Document

This document is intended to assist the Forum in identifying preferred effective near-term and long-term actions to enhance salmonid habitat in the Yuba River Watershed. This document is not intended to and will not provide consensus recommendations to any state or federal agency that participates in this process. This document is not evidentiary. This document is not a commitment by the members of a Forum caucus to support, proceed with or fund any salmon enhancement action. This document should not be communicated outside of the membership of the Forum, unless state or federal law requires otherwise.

Identification of Most-Promising Actions

The Water Caucus identified the most-promising potential YSF actions and listed the actions that the Water Caucus considers not to be promising. The Water Caucus considered: (1) the amount of “new” habitat created and the number of years (or frequency) with which it would be provided; (2) construction costs; (3) potential impacts (and potential magnitude of impacts) to other beneficial uses (e.g., water supply, hydroelectric generation, etc.); (4) construction feasibility; and (5) long-term operations and maintenance costs and issues. A brief rationale and statements for each action is provided below.

1. Most-promising: Lower Yuba River Improvements (Action 7)
   a. Creates new habitat during all water year types
   b. Lowest cost alternative
   c. Robust, mature and proven technologies – lowest technological risk
   d. Minimal risk to extant populations
   e. Minimal redirected impacts (no impacts to generation, water supply, flood control or landowners)
f. Improved passage at Daguerre Point Dam would be subject to the Corps study plan process

g. Does not require special federal or state legislation

2. Second Most-promising: Collect and Transport – North Yuba (Action 1)

   a. Provides new habitat during all water year types

   b. Most new habitat of trap and haul options – generally similar to Middle Yuba in dry years; far more habitat than Middle Yuba in wet years

   c. Minimal redirected impacts (no impacts to generation, water supply, flood control or landowners)

   d. Juvenile collection will be technically challenging – floating surface collector and massive guide nets on NBB Reservoir

   e. Likely requires special federal or state legislation

3. Less-promising: Collect and Transport – Middle Yuba (Action 2)

   a. Provides new habitat during all water year types

   b. Second most new habitat of trap and haul options – generally similar to North Yuba in dry years (but significantly less than North Yuba in wetter years)

   c. Potentially substantial redirected impacts if increased reservoir releases are required (impacts to upstream generation, Middle Yuba water supply, landowners)

   d. Potentially substantial impacts if reintroduced species enter the NBB reach (impacts to upstream power generation, water supply, flood control, landowners)

   e. Juvenile collection will be technically challenging – on-stream collection facilities efficiency will be impacted during high flows

   f. Likely requires special federal or state legislation

4. Not promising: Full Height Ladder over Englebright Dam (Action 6)

   a. Provides new habitat during all water year types. Similar to Middle Yuba trap and haul in dry years, additional habitat potentially including South Yuba in wet years, possibly a few miles of North Yuba habitat below Colgate.

   b. Substantial redirected impacts (impacts to upstream and downstream power generation, water supply, flood control, landowners)
c. Much higher cost than trap and haul alternatives; given operational challenges it is not clear that these are more “volitional” than trap and haul

d. Ladder operations will be technically challenging – hazardous location (subject to flood damage), temperature differentials between ladder outlet and inlet, no comparable successful high/long ladder

e. Juvenile collection will be technically challenging – inlet screens or floating surface collector

f. Upstream habitat usage unknown – temperature differential between Colgate outflows and upstream reaches can be problematic, value of North Yuba below NBB questionable

g. Likely requires special federal or state legislation

5. **Not promising: Englebright Dam Notch and Ladder (Action 5)**

a. Provides new habitat during all water year types. Similar to Middle Yuba trap and haul in dry years, additional habitat potentially including South Yuba in wet years, possibly a few miles of North Yuba habitat below Colgate.

b. Substantial redirected impacts (impacts to upstream and downstream power generation, water supply, flood control, landowners)

c. **Substantial** cost to manage sediment – second most cost of any alternative

d. Much higher cost than trap and haul alternatives; given operational challenges it is not clear that these are more ‘volitional’ than trap and haul

e. Unknown level of risk from future impacts: (i) from continued sediment inflow to Englebright; (ii) potential for flood flows to mobilize residual sediment in Englebright

f. Ladder operations will be technically challenging – hazardous location (subject to flood damage), temperature differentials between ladder outlet and inlet

g. Juvenile collection will be technically challenging – inlet screens or floating surface collector

h. Upstream habitat usage unknown – temperature differential between Colgate outflows and upstream reaches can be problematic, value of North Yuba below NBB questionable, low flow passage barrier on the Middle Yuba within a half-mile of the confluence with North Yuba

i. Funding would require an Act of Congress directing Corps to complete the work

j. Likely requires special federal or state legislation
6. **Not promising: Englebright Dam Removal (Action 4)**
   
a. Provides new habitat during all water year types. Similar to Middle Yuba trap and haul in dry years, additional habitat potentially including South Yuba in wet years, possibly a few miles of North Yuba habitat below Colgate. Some habitat value from restored reach beneath Englebright, possibly offset by habitat loss in Lower Yuba near Feather confluence due to shifted temperature profiles.

b. **Substantial** redirected impacts (impacts to upstream and downstream power generation, water supply, flood control, landowners, lost recreation at Englebright, increased flow fluctuations in Lower Yuba River)

c. **Substantial** cost to manage sediment; most costly of all alternatives

d. Unknown level of risk from future impacts from continued sediment inflow to the Lower Yuba River and Delta

e. Juvenile collection will be technically challenging – inlet screens or floating surface collector

f. Upstream habitat usage unknown – temperature differential between Colgate outflows and upstream reaches can be problematic, value of North Yuba below NBB questionable, trap and haul would be necessary to provide passage over NBB Dam, low flow passage barrier on Middle Yuba River within a half-mile of confluence with North Yuba and construction of a ladder and bypass system if fish could access Our House and upstream North Yuba River

g. Funding would require an Act of Congress directing Corps to complete the work

h. Likely requires special federal or state legislation

7. **Not promising: Collect and Transport – South Yuba (Action 3)**
   
a. Provides small amounts of thermally suitable habitat only in the wetter water year types. Therefore, it would be extremely difficult to justify expenditures and potential redirected impacts for an action that is only beneficial in some years. Access to the South Yuba may provide ancillary benefit to other actions (e.g., Englebright Dam Notch and Ladder), but not as a unique action.
AGENCY CAUCUS
Yuba Salmon Forum  
Caucus Identification of Most-Promising and Preferred Salmon Enhancement Actions

Introduction

The Yuba Salmon Forum charter states that the purpose of the Forum is to identify, evaluate, recommend and seek to achieve implementation of effective near-term and long-term actions to achieve viable salmonid populations in the Yuba River watershed to contribute to recovery goals, while also considering other beneficial uses of water resources and habitat values in neighboring watersheds, as part of Central Valley salmonid recovery actions. This document sets forth information from the Forum’s Agency caucus on most-promising and preferred salmon enhancement actions in the Yuba River watershed.

Purposes of this Document

This document is intended to assist the Forum in identifying effective near-term and long-term actions to enhance salmonid habitat in the Yuba River watershed. This document is not intended to and will not provide consensus recommendations to any state or federal agency that participates in this process. This document is not evidentiary. This document is not a commitment by the members of a Forum caucus to support, proceed with or fund any salmon enhancement action. This document should not be communicated outside of the membership of the Forum, unless state or federal law require otherwise.

Identification of Most-Promising Actions

The Agency caucus identifies the following potential salmon habitat actions as the three most-promising in no preferred order:

1. Action 1: Collection and transport to the North Yuba River
2. Action 2.5: Collection and transport above Englebright
3. Action 5: Englebright dam Modification and ladder

Rationale (if desired, set forth the rationale for selecting these actions in the order in which they are listed)

Identification of Preferred Actions (If Different from Most-Promising Actions)

1 The seven actions as presented for discussion were taken from a Draft YSF TWG memo Description of Potential Passage Scenarios dated Jan 2012, and were presented in that document as “seven representative Actions” as the basis of cost estimate development. Those Actions were identified as being roughly representative of the range of Actions possible for the enhancement of anadromous fish populations within the Yuba River watershed. Given the information we all have before us now, the Agency Caucus concluded that the Actions originally identified as 2 & 3 are best combined into a “new” action. We refer to this as Action 2.5.
The ____ caucus identifies the following potential salmon habitat actions as the three preferred:

1. ________________________________.
2. ________________________________.
3. ________________________________.

**Rationale** (if desired, set forth the rationale for selecting these actions in the order in which they are listed)
CONSERVATION CAUCUS
Yuba Salmon Forum

Conservation Caucus
Most-Promising and Preferred Salmon Enhancement Actions

I. Introduction

The Yuba Salmon Forum charter states that the purpose of the Forum is to identify, evaluate, recommend and seek to achieve implementation of effective near-term and long-term actions to achieve viable salmonid populations in the Yuba River watershed to contribute to recovery goals, while also considering other beneficial uses of water resources and habitat values in neighboring watersheds, as part of Central Valley salmonid recovery actions. This document sets forth information from the Forum’s Conservation Caucus on most-promising and preferred salmon enhancement actions in the Yuba River watershed.

II. Purposes of this Document

This document is intended to assist the Forum in identifying effective near-term and long-term actions to enhance salmonid habitat in the Yuba River watershed. This document is not intended to and will not provide consensus recommendations to any state or federal agency that participates in this process. This document is not evidentiary. This document is not a commitment by the members of a Forum caucus to support, proceed with or fund any salmon enhancement action. This document should not be communicated outside of the membership of the Forum, unless state or federal law require otherwise. Conservation Caucus member organizations that have been or may be engaged in litigation concerning Yuba River salmon provide this document as an offer to compromise pursuant to Federal Rule of Evidence 408. This document should not be construed as the appropriate remedy in any judgment issued in pending or future litigation. This document is intended to further the efforts of the Yuba Salmon Forum and shall not be construed as representing the views or opinions of any Conservation Caucus member organization in any forum or proceeding outside the Yuba Salmon Forum.

The Yuba Salmon Forum has generated two valuable products to inform identification of promising salmon enhancement actions in the Yuba River watershed: a Habitat Summary Report and a Fish Passage Infrastructure Report. Additionally, the YSF Technical Working Group has reviewed other relevant information. The Fish Passage Infrastructure Report describes seven “Actions”, each of which each consists of many “Elements”, some of which are repeated among multiple "Actions". By listing actions in this document, the Conservation Caucus is neither endorsing nor necessarily referring to "Actions" exactly as described in the Fish Passage Infrastructure Report.

III. Identification of Most-Promising Actions

The Conservation Caucus identifies the following potential salmonid habitat actions as most-promising and those which should be pursued through additional planning and evaluation:
A. Lower Yuba River Restoration and Enhancements.
B. Collect and Transport to the North Yuba and/or Middle Yuba River (Initially Spring-Run Chinook).
C. Volitional or Semi-Volitional Fish Passage Investigation.

The Conservation Caucus has developed a rationale for selecting these three actions, and this is briefly described here. We are developing a more thorough rationale document which refers to the biological and non-biological goals and objectives developed by the Forum, which we will share subsequently with the Forum when it is completed.

A. Lower Yuba River Restoration and Enhancements

Lower Yuba River Enhancements are entirely feasible and should be implemented as soon as possible. The resulting benefits could be realized within a few years, and many of those benefits, such as improved habitat for juvenile salmon rearing and survival, would transfer as benefits to populations that may be expanded into upper Yuba habitats. Exact details of the action need to be clarified. For instance, we recommend modifying the flow element to state that flows must be at least as beneficial as Yuba Accord flow requirements.

The Lower Yuba River Enhancements are not acceptable to the Conservation Caucus as a stand-alone action. It is essential to the interest of the Conservation Caucus that the Lower Yuba River Enhancements be combined with an Action to move salmonids into the upper Yuba River watershed.

B. Collect and Transport (Initially Spring-Run Chinook)

Collect and Transport is likely to result in significant enhancements to the status of spring-run Chinook salmon in the Central Valley.

While the North Yuba River contains the greatest amount of habitat for spring-run Chinook in the most years, the Middle Yuba appears to have a greater amount of habitat in dry and very dry years. We recommend that the Forum soberly debate the potential benefits and downsides of each of these potential destinations. To this end, we include in our rationale document a discussion of the advantages and disadvantages of each stream reach as a destination for a Capture and Transport action. We also recommend that the Forum consider water temperatures in each reach over the summer of 2014, to add to our understanding of the relative habitat opportunities in very dry years. SYRCL will place temperature loggers in each reach; the Conservation Caucus welcomes recommendations from the Technical Working Group on placement locations.

The Conservation Caucus recommends limiting initial implementation of the Capture and Transport program to spring-run Chinook salmon. This recommendation is based primarily on cost and known feasibility. This limitation will also allow time for evaluation and resolution of concerns relating specifically to steelhead, and allow evaluation of the feasibility of adding steelhead in a context where infrastructure is in place and overarching problems have been addressed.
Actions involving Collect and Transport must be planned as additions to Lower Yuba River Enhancements, and not be considered as alternative actions.

**C. Volitional or Semi-Volitional Fish Passage Investigation**

The Conservation Caucus does not believe that volitional or semi-volitional fish passage scenarios, such as incremental notching of Englebright dam and alternative sediment management, have been sufficiently explored by the YSF to conclusively evaluate their feasibility or promise. The caucus recognizes that any such scenario is likely to be more expensive and lengthy in duration than an action based on Collect and Transport. The Conservation Caucus therefore recommends that the Forum include as part of its go-forward actions a separately funded program to further investigate the feasibility and costs of a future volitional or semi-volitional fish passage action. Additionally, we recommend that equitable options for financing such a program be explored by the Forum. Additional discussion is included in our rationale document.
Action: Lower Yuba River Enhancements

Lower Yuba River Enhancements, described as Action 7 in the YSF Infrastructure Report, have relatively low cost and high feasibility compared to all other actions. The action will add to existing habitat availability for spring-run Chinook salmon and steelhead trout population, increasing habitat quality or availability for multiple life stages, including: adult migration and holding, spawning, egg incubation, and juvenile rearing. YSF objectives concerning habitat are much more easily achieved in the lower Yuba River than for any area upstream because the lower Yuba River is currently accessible to anadromous salmonids with reliable supplies of cold water, and the habitat area in the lower Yuba River much greater than any single area for reintroduction in the upper watershed. Some of the action elements will be self-sustaining, and some will require maintenance. The rehabilitation of the Englebright Dam Reach, for example, will require maintenance in the form of gravel injections. Improvements to riparian and floodplain habitat condition may involve some maintenance but will consist mostly of initial projects designed to work with natural processes for long-term maintenance and habitat improvement.

Actions in the lower Yuba River would increase abundance and productivity of salmonid populations. Diversity of populations may improve if habitat enhancements succeed in supporting greater survival among various life history strategies. For example, the occurrence of yearling Chinook smolts or older steelhead smolts may increase. However, spatial structure of the central valley populations would remain unchanged. Moreover, viability of spring-run Chinook salmon in the Yuba River could not be achieved unless a segregation structure were effectively operated to limit introgression of hatchery fish and fall-run salmon. For the same reasons, a segregation structure would be critical to the establishment and maintenance of a genetically distinct population of spring-run Chinook salmon in the lower Yuba River. Serious questions remain about the feasibility and acceptability of an effective segregation structure on the lower Yuba River. Additionally, it is not clear if pressure from hatchery fish straying into the Yuba River will continue at present rates or change due to management practices in the Central Valley.

Biological Criteria Upsides:

1. The action will benefit both spring-run Chinook and steelhead.
2. The action will create or improve the largest amount of physical habitat of any of the actions.
3. The action meets most biological goals and objectives for habitat and population viability for both spring-run and steelhead. The action is likely to meet performance indicators for productivity and abundance. With a successful segregation weir or in combination with a
Collect and Transport, the action would reduce the risk of losing the population to catastrophe.
4. The lower river enhancements will benefit downstream migrants both from the lower river and from the capture and transport action (depending on release point from capture and transport action).

Biological Criteria Downsides and Concerns:

1. The action is not likely to meet the biological goals for genetically distinct populations of spring-run and steelhead, or the objective of minimizing hatchery contribution unless a segregation weir, in combination with hatchery management, is surprisingly effective.
2. If not meeting the objectives for hatchery contribution, the action will not fully meet the goal for a viable population.
3. Extremely low survival of Yuba River emigrants to returning adults suggests that spring-run of the lower Yuba may be limited in productivity due to out-of-basin factors. By contrast Butte Creek spring-run are more productive. Depending on presence and operation of a segregation weir, migration timing into and up the lower Yuba River may or may not limit opportunities for habitat use. Combining this action with a Capture and Transport action may eliminate or modify the need for a segregation weir.
4. A segregation weir may have impacts on steelhead and resident trout.

Non-Biological Upsides:

1. Funding required for this action is not beyond what is likely to be available through cost-matching efforts. The action appears to be constructible, have no effect on water supply, have no particular permitting obstacles considering its scope, and have local support.
2. Land acquisition does not appear to be limiting, though this needs to be clarified in the context of improved project definition.

Non-Biological Downsides:

1. The action may conflict with some recreational angling and boating (especially segregation weir).
2. Modifications to Daguerre Point dam would require an active and sponsoring role by the Army Corps of Engineers, and this may require congressional authorization and other steps to be taken at a rate determined by the Corps.
3. There are numerous technical issues; for the moment we refer most of this back to the analysis performed to date and to future analysis and problem solving.

**Action: Capture and Transport to North Yuba (Initially Spring-run Chinook)**

The North Yuba River contains the largest amount of habitat among the four candidate areas in the upper Yuba River watershed for salmon reintroduction. Natural river processes in the North Yuba River contribute to the feasibility and likelihood of meeting objectives concerning adequate habitat to support a viable spring-run Chinook salmon and steelhead population without human-implemented maintenance activities. However, the infrastructure
necessary to collect, transport and release adults and juveniles would require large maintenance costs.

If necessary infrastructure could be built and maintained, it seems likely that viable populations of spring-run Chinook salmon and steelhead trout could be established in the North Yuba River. These populations would decrease extinction risk for Central Valley ESU’s, but the populations themselves may not achieve a low extinction risk due to vulnerabilities associated with drought years, climate change, poaching, dependency on infrastructure and dependency on one river. If the populations in the North Yuba River could be established and maintained over the long-term, these vulnerabilities notwithstanding, then there is likely that genetically distinct populations could be established and maintained.

Biological Criteria Upsides:

1. The action can meet all of the spring-run biological goals and objectives for habitat, viability and genetically distinct population.
2. Of potential destinations for capture and transport, the North Yuba has the greatest amount of habitat in most years.
3. North Yuba has sufficient holding and spawning habitat in dry years using upper tolerable criteria for thermal suitability.
4. Capture and transport allows selection of adult fish based on marking and marking of juvenile fish.
5. Construction of upstream capture facilities can dovetail with needed improvements to passage at Daguerre Point Dam.
6. The action can be structured so that adult fish can be released at alternative locations to assist migration in the North Yuba (good year-round road access).
7. The North Yuba has more potentially usable tributary habitat for steelhead than the Middle Yuba.
8. The North Yuba geology is more Cascadian than the granitic Middle Yuba, and may be more naturally resilient to climate change.

Biological Criteria Downsides and Concerns:

1. Holding pools in the upper section of the accessible North Yuba are generally not of the best quality; most of the best pools in North Yuba are near and downstream of Downieville (generally, best pools are below RM 38) and thermally suitable reaches in dry years.
2. Relies on human intervention and may have mortality during and after transport.
3. A decision must be made how far upstream to release adult fish, and whether two separate release facilities or locations are needed.
4. Steelhead are not generally believed to transport well; if the action is expanded to steelhead, this obstacle will need to be overcome.
5. If steelhead are introduced, there may be undesirable genetic exchange with existing rainbow trout populations.
Non-Biological Upsides:

1. Floating surface collectors are a proven technology, and location of a collector on New Bullards Bar Reservoir appears feasible.
2. The action has no potential negative impact to water supply, hydropower, or existing dams and diversions.
3. While the cost would be substantial, the cost would be far less than existing cost estimates for volitional options.
4. Salmon could provide a tourism interest for Sierra County.

Non-Biological Downsides and Concerns:

1. There may be local opposition to salmon and to implementing, funding and regulating entities.
2. The action is not volitional and will rely on permanent, more or less constant operation and maintenance.
3. There may be real or perceived conflicts with recreational angling and mining in the North Yuba River.
4. There may be conflicts with recreational boating in New Bullards Bar Reservoir.
5. There are numerous technical issues; for the moment we refer most of these back to the analysis performed to date and to future analysis and problem solving.

Action: Capture and Transport to Middle Yuba (Initially Spring-run Chinook)

The Middle Yuba River has substantial habitat available to spring-run Chinook salmon if made accessible. The amount of habitat available in the Middle Yuba River during drier years such as 2008 and 2009 is significantly greater than what is available in the North Yuba River. The relatively slow rate of longitudinal warming and the cold water storage of Jackson Meadows reservoir may provide more resilience to thermal stress in the Middle Yuba River during dry years as compared to the North Yuba River. Additionally, the Middle Yuba River is more remote than the North Yuba River and salmon populations in the Middle Yuba River would be expected to receive less poaching or sabotage to the adult release facility.

Considerations in regard to biological goals and objectives are similar as they are for the North Yuba River. If necessary fish passage infrastructure could be built and maintained, it seems likely that viable populations of spring-run Chinook salmon and steelhead trout could be established in the Middle Yuba River. These populations would decrease extinction risk for Central Valley ESU’s, but the populations themselves may not achieve a low extinction risk due to certain vulnerabilities. If the populations in the Middle Yuba River could be established and maintained over the long-term, these vulnerabilities notwithstanding, then there is likely that genetically distinct populations could be established and maintained.

A combination of collection and transport to the North Yuba River and the Middle Yuba River would yield an overall population with less extinction risk than a population dependent on only one of the rivers. Selection of one river over the other should follow a more thorough
analysis or risks, including severe drought conditions, climate change scenarios and maintenance or dependence on infrastructure.

Biological Criteria Upsides:

1. The action can meet all of the spring-run biological goals and objectives for habitat, viability and genetically distinct population.
2. Of potential destinations for capture and transport, the Middle Yuba has the greatest amount of habitat in dry and very dry years.
3. Middle Yuba had about 13 miles of suitable habitat in the very wet year 2011; half of the habitat fell within the thermally optimal range.
4. The Middle Yuba has 15 holding pools in the upper end of the accessible reach.
5. The Middle Yuba has storage in Jackson Meadows upstream that can potentially be used to manage thermal conditions during summer heat events.
6. Capture and transport allows selection of adult fish based on marking and marking of juvenile fish.
7. Construction of upstream capture facilities can dovetail with needed improvements to passage at Daguerre Point Dam.

Biological Criteria Downsides and Concerns:

1. Migration in the Middle Yuba after adult fish are transported to Our House Dam may be constrained by timing. In 7 of 33 water years, modeled Middle Yuba flow at Wolf Creek drops below 100 cfs by June 1. In 16 of these 33 years, modeled flow drops below 100 cfs by June 15. See attachment. Collection of adult salmon in the lower Yuba River before these dates may be impossible.
2. There appears to be little tributary habitat that would be usable by steelhead if they were subsequently reintroduced to the Middle Yuba.
3. Relies on human intervention and may have mortality during and after transport.
4. Steelhead are not generally believed to transport well; if the action is expanded to steelhead, this obstacle will need to be overcome.
5. If steelhead are introduced, there may be undesirable genetic exchange with existing rainbow trout populations.

Non-Biological Upsides:

1. While the cost would be substantial, the cost would be far less than existing cost estimates for volitional options. The Middle Yuba capture and transport action was estimated to be somewhat less expensive than the North Yuba action.
2. Construction at Our House Dam could dovetail with facilities improvements that are needed to protect species that are already present.
3. The action may be scalable to a volitional or semi-volitional action on the Middle Yuba.
4. One semi-volitional action alternative that warrants exploration is the volitional passage of juvenile salmon from the Middle Yuba to the Lower Yuba River through the Englebright Reservoir and either over the dam or through the powerhouses.
Non-Biological Downsides and Concerns:

1. The instream capture facility evaluated as part of this action is an untested technology.
2. The instream capture facility evaluated as part of this action may not function during high flows, and must be designed to withstand very high flows.
3. The action is not volitional and will rely on permanent, more or less constant operation and maintenance.
4. The action could impact NID water supply and NID and PG&E hydropower if additional flow were required to support reintroduction. However, based on analysis of the Foothills Water Network/Department of Fish and Wildlife flow alternative for the Yuba-Bear relicensing, the Conservation Caucus believes that these impacts would be small, and could be mitigated to zero in almost all years.
5. Our House Dam, 10-15 miles downstream of holding habitat, appears to be the only practical location for an adult release facility. There is not reliable road access for transport vehicles to areas near holding habitat on the Middle Yuba.
6. NID appears to disfavor reintroduction to waters affected by its hydro and water supply facilities.
7. There are numerous technical issues; for the moment we refer most of these back to the analysis performed to date and to future analysis and problem solving.

Further Investigation of Volitional and Semi-Volitional Options

Fish passage at Englebright Dam could result in viable populations in the upper Yuba River watershed due to potential habitat available for spring-run Chinook salmon in the Middle Yuba River. Potential habitat for steelhead exists in the Middle and South Yuba River watersheds. While a 260’ fish ladder at Englebright Dam (Action 4) is not considered biologically feasible, there may be variations on dam notching (Action 6) that are both feasible and likely to succeed in accomplishing biological objectives.

The Conservation Caucus recognizes that the cost estimates for volitional passage options are very high and that significant biological and technical problems concerning volitional passage have come to light through the studies conducted for the Forum. The Caucus also recognizes that YCWA in particular would prefer to eliminate volitional options. However, there continues to be widespread interest within the Conservation Caucus and among the members of their organizations in volitional passage on the Yuba River. The Conservation Caucus believes that additional options for the development and evaluation of volitional passage should be explored.

In order to make a volitional alternative a practical consideration, a number of problems would need to be resolved. We discuss some of these problems below. Many of these problems assume that notching of Englebright Dam would be part of an action.

1. The available cost estimates need to be brought down by an order of magnitude.
2. Sediment disposal accounts for the largest estimated expense, by far, for volitional options. To bring the cost estimates down, alternative feasible approaches to sediment behind Englebright Dam would need to be devised.
3. Any alternative approach to sediment behind Englebright Dam would need to address a suite of issues, including flood control and mercury.

4. Fish ladder design would need to allow upstream passage past a barrier whose height would remain challenging, even after notching the Englebright Dam to half its present height.

5. Fish ladder design for Englebright Dam would need to be stable in the face both of unstable soils and high flow events during which water spills over the dam.

6. For the goal of establishing genetically distinct populations, some segregating structure would be necessary under continuing pressures from hatchery strays. This could be provided by a notched dam and ladder. Juvenile fish collection is not considered a necessary component of such a scenario, but some juvenile fish sampling for monitoring purposes would be necessary.

7. In order for upstream volitional passage of spring-run Chinook to succeed, upstream migration timing would generally need to be earlier in almost every year. Many of the thermal issues that are very difficult in June would be much more manageable in April. Changes in the operation of the lower Yuba, the lower Feather, and in the Middle Yuba downstream of Our House Dam would likely be necessary to consistently move spring-run migration timing so that it occurred earlier in the year. While such change would likely be beneficial for non-volitional options as well, its absence could be a fatal flaw for volitional actions, at least for spring-run Chinook.

8. At minimum, thermal gradients would need to be confronted: passing from the lower Yuba to a fish ladder; passing from a fish ladder into Englebright Reservoir; passing the tailrace of Colgate Powerhouse; ascending the upper main Yuba to confluence with Middle Yuba; and ascending the Middle Yuba up to Our House Dam.

9. Upstream and downstream migration facilities would need to be constructed at Our House Dam.

10. A fish screen would need to be constructed at Our House Dam.

11. A means might need to be developed and deployed to keep spring-run Chinook out of the South Yuba and out of the North Yuba below New Bullards Bar Dam, particularly during high flow events in each branch of the river. Such barriers could have their own suite of impacts that would need to be mitigated.

12. Downstream passage would need to be assured at New Colgate Powerhouse tailrace.

13. Downstream passage would need to be assured past Englebright Dam. This could involve a wide range of levels of effort and degrees of human intervention, from little to no engineering, to a specifically designed volitional downstream passage structure, to a floating surface collector on Englebright Reservoir.

14. Volitional actions could reduce the ability of YCWA to operation New Colgate Powerhouse for peaking and ancillary services.

15. Increased flow in the Middle Yuba below Our House Dam would likely be needed for migration into the Middle Yuba. This could reduce hydropower generation at New Colgate Powerhouse. It is unlikely that this would affect water supply.

16. Authorization to alter an Army Corps of Engineers Dam would need to be obtained. It is not clear at this time what this would involve.

17. There would likely be local opposition to modification of Englebright Dam in Yuba County. There would need to be technical analysis and political outreach to address real or perceived concerns, particularly about flood control.
18. There are numerous additional technical issues; for the moment we refer most of these back to the analysis performed to date and to future analysis and problem solving.
### Data from Yuba Salmon Forum Summary

**Habitat Analysis (spring-run Chinook)**

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<th></th>
<th>2008</th>
<th>Middle Yuba</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>North Yuba</td>
<td>23 (above Our House Dam)</td>
</tr>
<tr>
<td><strong>Barrier-free River Miles</strong></td>
<td>33.7</td>
<td>23</td>
</tr>
<tr>
<td><strong>Temp criteria</strong></td>
<td><strong>Existing</strong></td>
<td><strong>FERC/4e</strong></td>
</tr>
<tr>
<td><strong>Miles of holding habitat</strong></td>
<td>( UO )</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>( UT )</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Holding pools &gt;10’</strong></td>
<td>( UO )</td>
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</tr>
<tr>
<td></td>
<td>( UT )</td>
<td>5</td>
</tr>
<tr>
<td><strong>Miles of spawning habitat</strong></td>
<td>( UO )</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>( UT )</td>
<td>7.7</td>
</tr>
<tr>
<td><strong>Redds</strong></td>
<td>( UO )</td>
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</tr>
<tr>
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<td>( UT )</td>
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</tr>
<tr>
<td><strong>Miles of juvenile rearing habitat</strong></td>
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</tr>
<tr>
<td></td>
<td>( UT )</td>
<td>5.5</td>
</tr>
<tr>
<td><strong>Area of rearing habitat (sqftx1000)</strong></td>
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<td>0</td>
</tr>
<tr>
<td></td>
<td>( UT )</td>
<td>593</td>
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</table>

UT is general literature, not Butte Creek
For values dependent on MY temp modelling, used values adjusted to compensate for model overestimate.
Last day of each water year when average daily flow in Middle Yuba at Wolf Creek is greater than 100 cfs (SYNTHESIZED)

Source: synthesized hydrology dataset for Yuba-Bear/Drum-Spaulding relicensing. Assumes existing (base case) flow requirements.

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<thead>
<tr>
<th>Water Year</th>
<th>MY above Wolf Cr.</th>
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<td>1992</td>
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<td>1976</td>
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<td>2001</td>
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<td>May 31</td>
</tr>
<tr>
<td>1977</td>
<td>June 2</td>
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<tr>
<td>1988</td>
<td>June 2</td>
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<tr>
<td>2004</td>
<td>June 5</td>
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<tr>
<td>1990</td>
<td>June 7</td>
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<tr>
<td>1985</td>
<td>June 8</td>
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<td>June 11</td>
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<td>June 14</td>
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<td>2000</td>
<td>June 15</td>
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<td>June 16</td>
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<tr>
<td>1983</td>
<td>August 5</td>
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</table>