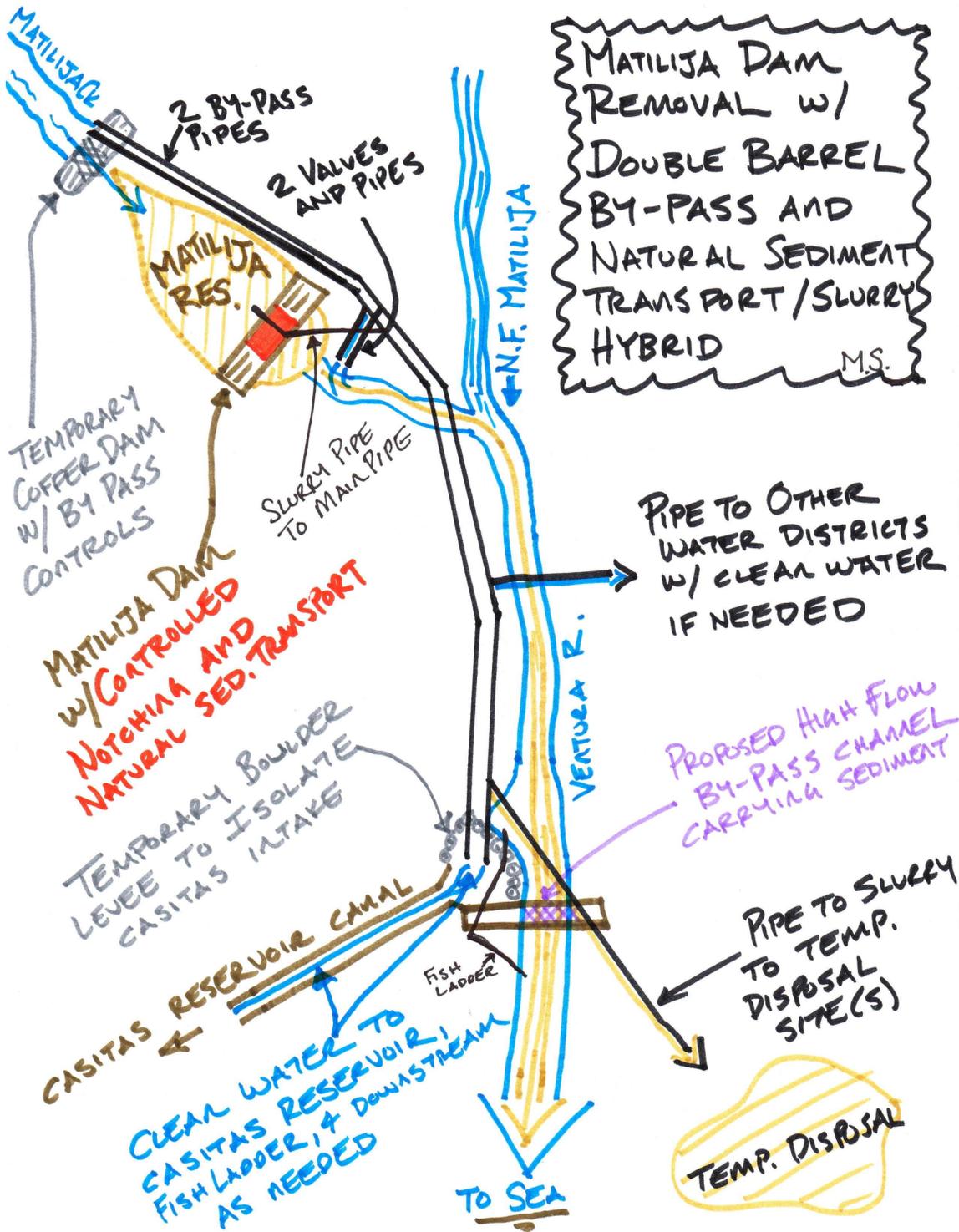


## **Double Barrel By-Pass- A Flexible Sediment Alternative for Matilija Dam Removal**

This hybrid alternative for removing Matilija Dam consists of several existing project components, and some new ones, to allow maximum flexibility in storing and disposing of trapped sediment, while providing “clean” (above reservoir) water to downstream water districts throughout the project construction, ensuring adequate protection for wildlife, and being able to take advantage of potential optimal conditions to naturally transport much or all of the fines not stored in upstream sites to the sea in one, or a few, short duration high flow events.

As the name suggests, this alternative design would have two pipes (barrels) and would allow natural clean flows upstream of Matilija Reservoir to be captured and by-passed around the reservoir, dam, and construction site extending into the scour pool immediately below the dam. Additionally, the two pipes would allow the flexibility to return clean flow to Matilija Creek just downstream of the dam to ensure stream flow to maintain high quality for wildlife, migration, and downstream water diversions and facilities. During high flows, the two pipes, that also extend downstream to the Robles Diversion Dam, would allow for clean water to be supplied to Casitas and other water districts while controlled notching and natural sediment transport carry sediment downstream and past Robles through their high flow by-pass. In addition, with the two pipes, the project can maintain the slurry capability during low to moderate flows, if needed, and use one of the pipes to slurry material downstream to the upper-most discussed temporary sediment disposal sites.



MATILIJIA DAM  
REMOVAL W/  
DOUBLE BARREL  
BY-PASS AND  
NATURAL SEDIMENT  
TRANSPORT/SLURRY  
HYBRID  
M.S.

TEMPORARY  
COFFER DAM  
W/ BY PASS  
CONTROLS

MATILIJIA DAM  
W/ CONTROLLED  
NOTCHING AND  
NATURAL SED. TRANSPORT

TEMPORARY BOULDER  
LEVEE TO ISOLATE  
CASITAS INTAKE

CASITAS RESERVOIR CANAL

CLEAN WATER TO  
CASITAS RESERVOIR,  
FISH LADDER, & DOWNSTREAM  
AS NEEDED

TO SEA

PIPE TO OTHER  
WATER DISTRICTS  
W/ CLEAN WATER  
IF NEEDED

PROPOSED HIGH FLOW  
BY-PASS CHANNEL  
CARRYING SEDIMENT

PIPE TO SLURRY  
TO TEMP.  
DISPOSAL  
SITE(S)

TEMP. DISPOSAL

## **Assumptions:**

*A temporary cofferdam and by-pass are needed for all options. Make it more functional.*

For any of the options discussed so far, including interim lowering of the dam to sediment level, it seems that a temporary cofferdam will have to be built at the upstream end of trapped sediment behind Matilija Reservoir. This will likely be required in order to divert low flows around the construction site (both at the dam and in the reservoir) to minimize impacts to downstream water quality, relocate native wildlife in the reservoir and scour pool below the dam, while removing non-native species, and ensuring that construction crews can access a dewatered dam and construction site. An expanded cofferdam design with two larger capacity by-pass pipelines would allow maximum flexibility to divert larger amounts of clean water immediately downstream of the dam or directly to the Casitas Reservoir canal and to other downstream water districts, if needed. Additionally, if the coffer dam was outfitted with high flow by-pass capabilities, such as flashboard gates or large, embedded, valve controlled pipes, it would allow increased control and flexibility to send water into the reservoir site for either fine sediment slurring down one of the two main pipes below the dam or natural transport through the notch. A she slurry pipe from the reservoir could connect into one of the two main pipes going downstream past Robles to disposal sites or to be mixed into the river with adequate flow. A coffer dam with this increased capability would also allow for a wider window of opportunity for construction crews to work within the reservoir site while developing improved sediment disposal sites within the reservoir area and assisting with forming the new pilot channel through the reservoir site as sediment is transported away.

*Fine sediment disposal sites near the reservoir will be maximized.*

This proposal would allow for a longer window of construction time in the reservoir area to build temporary sediment disposal areas and even permanent sediment disposal areas as part of discussed roadfill elevation and erosion control measures. The expanded cofferdam and two pipe by-pass could divert higher flows around the project site, enabling construction crews to continue working in the reservoir area and at the dam during higher flow events.

## **Issues/Concerns:**

Fish Migration and Dewatering-

*There was a question at the third Fine Sediment Group meeting about a) potential dewatering of Matilija Creek downstream of the dam, b) negative impacts to fish migrating upstream of Robles Diversion to the North Fork Matilija, and c) causing an impediment to migration at Robles Diversion Dam.*

a) This proposal can, and should, be operated so that the above issues would not occur. One, or both, of the main pipes by-passing clean flows around Matilija Reservoir and Dam would have outlet valves to allow all the above-reservoir flows to reenter Matilija

Creek below the dam's scour pool and construction operations. This would provide even better water quality in Matilija Creek below the dam and reservoir than occurs now due to the negative impacts of the reservoir on water quality. Elimination of evaporation from the reservoir may actually improve flow quantity slightly as well during the summer. As the reservoir and downstream scour pool are dewatered, the collection and relocation of native species can be easily planned and executed while non-native species can be taken out of the system and prevented from dispersal upstream and downstream.

b) Fish migration from Robles Diversion upstream to the North Fork, and even below Matilija Dam, should not be significantly impacted with well operated by-pass controls.

During low flows, all clean water by-passed around the reservoir and dam could be returned to Matilija Creek just below the dam's scour pool and of a higher quality than the currently impacted water quality there in summer. Flows from the North Fork would be unaltered during the entire project.

During moderate flows, the above scenario could be employed or one of the main pipes could directly supply a portion of clean water directly to Matilija Creek below the dam, or to the Robles Diversion and downstream water districts, while the other pipe could be used to slurry fines to a temporary downstream disposal site. The valve immediately below the dam could be operated during such flows to maintain an adequate amount of flow down the short stretch to the North Fork. The addition of North Fork flows would maintain adequate migration flows downstream to Robles Diversion. This moderate flow scenario is the only one when flows might be moderately reduced in the reach between Robles and the North Fork, and up to the dam. However, valve control can ensure that there is adequate clean water and depth for steelhead migration from the dam site downstream and it is likely that water quality will be the same or even increased slightly, as described above.

During high flows, we would have the option to (if we get adequate flushing flows during the couple year project construction) to let the right amount of high flows past the coffer dam into the reservoir and allow managed, natural sediment transport through the notched dam and downstream past the Robles Diversion intake in the proposed high flow by-pass channel. As mentioned, with the ideal high flows, most of the fines could be carried past Robles Diversion, in the high flow by-pass, and out to sea in a one or a few flow events. During this flushing flow we could still divert cleaner water at the cofferdam and pipe the maximum amount, in both pipes, downstream to Casitas and other water districts, if needed. While water quality would be significantly impacted during the flushing event, flows would not preclude fish migration upstream into the relatively clean flows of the North Fork. As discussed already, the suspended sediment load of this flushing event may not be unlike some of the natural conditions steelhead and other wildlife are adapted too in this area (i.e. recently on Sespe Ck. and the Sisquoc R. following extensive basin fires and mass erosion events over the past couple years).

c) During low flows, steelhead migration conditions past Robles could be similar to the present and potentially improved if the high flow by-pass channel to be built incorporated

a permanent or temporary low flow passage feature. During moderate flows, the fish ladder, and potentially high flow by-pass to be built, would still pass steelhead in both directions as presently, with possible increased water quality as described above. The only reduction in flow under this scenario could be the water used in one of the pipes if the option to slurry sediment from Matilija Reservoir to the temporary disposal site is utilized. During high flows, steelhead could migrate upstream in the high flow by-pass channel, if the design incorporates adequate migration characteristics, which we support. In addition, one or more of the pipes diverting cleaner water from upstream of Matilija Reservoir could release some, ideal, flows for the fish ladder at Robles Diversion and over the potential boulder levee isolating the intake (Note: An isolating boulder levee is described in the water rights section below). In addition, upstream migrating steelhead that do not take the high flow by-pass could be trapped below Robles or at the top of the fish ladder and released upstream, or even transported to cleaner flows in the North Fork. Such trapping and transport of adult steelhead to higher quality water would only last a couple years during project construction.

#### Other Water District Effectiveness-

*Concern was raised about the impacts of such a proposal on downstream water districts ability to get enough high quality water.*

As described above, the reaches upstream of Robles Diversion would not be dewatered at any time and I think this was part of the concern. Low flow conditions would remain the same and may actually increase and improve in quality due to a lack of evaporation from the reservoir and elimination of factors negatively impacting water quality released from the reservoir. Moderate flow conditions, with partial slurring, may decrease flows in the reach between Robles and Matilija Dam by a small amount, but direct feed of cleaner water from upstream of the reservoir in the second pipe can be split between adequate releases below Matilija Dam and Teed-off pipe delivering some flows to downstream water districts as described above. During high flows, there will be plenty of water in this reach. Additional studies will be needed to assess natural sediment transport impacts to water district operations. Naturally transported sediment and slurried sediment (with the associated nutrients) would by-pass Robles Diversion and not impact Casitas diversion during the entire window of construction. Availability of flows may be restricted slightly, for a short duration, to allow high sediment loads to pass through the high flow by-pass, but during this time Casitas could still be receiving what clean water surplus from above Matilija is available through the two pipes.

#### Water Rights and Point of Diversion-

*There were questions about how this proposal could deal with complex water rights and the specified point of diversion from the Ventura River at Robles Diversion.*

One possible solution would be to build a temporary boulder levee that isolates the Robles Diversion intake area, on far river-right, from the rest of the Ventura River channel. This would allow for the by-pass pipes from upstream of Matilija Reservoir to provide clean water into the isolated area of the Ventura River immediately upstream of the diversion intake and allow for it to be diverted into the Casitas canal without mixing with the higher sediment laden flows going through the high flow by-pass. By not piping directly into the Casitas Reservoir canal, but rather into the isolated river channel just upstream, Casitas would still be diverting from the river and this may facilitate the continued compliance with existing water rights.

### **Compatibility with Existing Prerequisites and Ideas**

#### Interim Notching to Sediment Level-

This proposal can work well with lowering the dam to sediment level as soon as possible. For this interim dam lowering, it is expected that a coffer dam and surface flow by-pass would need to be employed anyway to dewater the reservoir and area around the dam, including the scour pool. This will be important not only for the construction crews, but also to effectively transport native species in the reservoir and downstream scour pool and to remove the many non-native species we don't want dispersing upstream or downstream. A small coffer dam and bypass could be built for the dam lowering, but we might as well capitalize on this construction effort and set up a more effective coffer dam and two pipe bypass that carries higher flows and enhances the ability to control and release water into the reservoir site. For the interim dam lowering phase, the coffer-dam and two-pipe by-pass could extend to just below Matilija Dam. The pipe sections extending downstream to tie into Robles Diversion could be installed later as part of the dam removal phase. Between the time of interim dam lowering and future full dam removal operations, the coffer dam gates could be left open to allow natural flows across the reservoir and dam, utilized to control releases across the reservoir site, or to enable by-passing flows to the creek immediately downstream as desired.

#### Re-Authorization?

Project stakeholders would like to avoid congressional reauthorization and this proposal might be designed to ensure that it does. This proposal would retain the partial slurry option and temporary downstream disposal site, although on a reduced scale and with adequate flows may allow for almost all fines to be naturally transported to sea. It is assumed that a cofferdam and by-pass will have to be constructed around the reservoir, dam, and construction site in any scenario, so this proposal improves the capability and flexibility of that needed component. With the two pipes, the project would have additional flexibility to use them for carrying clean water to downstream water districts, slurring sediment to temporary disposal sites, or using the pipes independently for both activities at the same time. The proposal will have considerable costs, but would be expected to be slightly less expensive than the already approved project due to a reduction in downstream sediment storage and shorter pipeline configuration needed to the lower disposal sites, as well as reduced or eliminated downstream disposal site needs.

With the exception of a couple short, extremely high sediment flow events (if adequate flows occur during construction and allow significant natural sediment transport), water quality downstream of the project site may be improved as cleaner flows can be bypassed around the reservoir and dam site during construction and returned to the creek downstream of the dam.

-Matt Stoecker