

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
600	1	I am opposed to your plan to increase unimpaired flows on three area rivers because it harms our economy. I appreciate that www.savethestan.org proposes different methods to help the environmental challenges we create by being a first world industrialized country.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
601	1	California is the one place on Earth where we have diverse ecosystems. Survival of the world's species require that we responsibly protect the ecosystems here.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
602	1	At a time when more and more people are recognizing that water is our most vital resource and further, that its management must take into account long-term factors, it is clear that science must guide decisions not profit.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
603	1	I live in Butte Creek Canyon and we have the last best run of spring Chinook salmon in the state. This only happens when government and public agencies work together to see the bigger picture and make plans that will support the environment and eco-systems in the long view.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
604	1	I urge you to follow the science and set Delta outflows to protect/restore salmon habitat and other aquatic life. Although the agricultural industry says it will suffer without increased water diversions, the commercial and sports fishing industries are suffering with current levels of water diversion. Salmon and aquatic life did just fine with California's limited water supply before ranchers, the Department of Water Resources and the Bureau of Reclamation constructed an unsustainable, water-demanding agricultural community in the San Joaquin and Sacramento Valleys.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
605	1	Please, please, set the Delta water flows at levels that will protect that ecosystem.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
606	1	A permanent reduction of exports must happen to protect the Delta. What is the true efficacy of this update to San Joaquin flow standards if water exports from the Delta are not going to be dealt with? The San Joaquin River must reach Chipps Island in order to restore, protect, and preserve the entire estuary. If unsustainable water exports are not dealt with, we worry that water quality and quantity objectives for the Delta will never be met.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
606	2	I do not want to see a weakening of salinity standards in the South Delta. Water quality standards must be protected for drinking water, agriculture, municipal discharge, fisheries, recreation, and ground water recharge, and to reduce the future risk of increased harmful algal blooms that are toxic to humans, dogs, fish, and wildlife in south Delta channels.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
606	3	The State Water Board must consider environmental justice communities in terms of drinking water and domestic use. Phase 1 Recirculated Draft SED fails to consider environmental justice communities in chapters 5 and 9 (hydrology/water quality and groundwater).	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
606	4	I believe that water flows on the San Joaquin River must be adequate to restore and protect fisheries—and to protect the public trust value of the Bay-Delta estuary. A 40% restoration of flows will not accomplish this end. Science tells us that we need 60% of flows restored on the San Joaquin River for the health of the Bay-Delta.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.

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607	1	I would like to encourage you to implement your plan to keep 40% more water flowing in the rivers to help salmon, steelhead, and other game fish. More water improves the watershed as well to lower temperatures and prevent algae build up.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
608	1	<p>As a wholesale customer of SFPUC that purchases 60% of its potable water supply from the San Francisco Regional Water System, water supply available to Milpitas under the SED proposal could be reduced.</p> <p>Milpitas also purchases surface water from the Santa Clara Valley Water District (SCVWD), whose imported and local supplies would also be subject to potentially significant reductions in a drought.</p>	Please see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, regarding the State Water Board’s evaluation of potential reductions in water supply and associated economic considerations and other impacts within the SFPUC Regional Water System (RWS) service area with implementation of the plan amendments. The master response identifies the main points of disagreement or differing assumptions between the SED and the comments. As described in Master Response 8.5, the SED identified reasonably foreseeable actions that could be taken by affected entities to comply with the plan amendments and in response to reduced surface water supplies. These actions did not include the severe mandatory rationing described by SFPUC because it was not reasonably foreseeable that a water supplier would impose drastic mandatory water rationing on its customers without first attempting other actions to replace any reductions in water supplies with alternative sources of water, such as through water transfers.
608	2	Reductions in water supply from the SFPUC may force Milpitas to use more local groundwater supplies. Since groundwater recharge is largely dependent on managed programs from SCVWD, additional groundwater pumping could have potentially significant undesirable results, such as groundwater overdraft, sea water intrusion, and land subsidence, which were not adequately analyzed in the SED.	Please see response to comment 608-1. Please also see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, regarding groundwater use. Finally, please also see Master Response 1.1, General Comments, for a general discussion as to the approach to the analyses contained in the SED, and the programmatic nature of analysis, and Master Response 8.5, for a more specific discussion of programmatic analysis.
608	3	Milpitas has made significant strides in water conservation in the past 10 years. Residential per capita water use decreased 39% from 176 gallons per capita per day (gpcd) to 108 gpcd.	This comment provides information on residential per capita water use reduction for the City of Milpitas over the past decade but does not raise significant environmental issues or make a general comment regarding the plan amendments. The State Water Board acknowledges the City of Milpitas’ water conservation effort and ongoing commitment to demand management.
608	4	Based on Milpitas’ 2015 Urban Water Management Plan, this significant cut to water supply would force Milpitas to take a number of significant actions including, but not limited to, implementing a moratorium on new development in the service area, importing water, increasing reliance on local supply, and minimizing nonessential uses of water so that water is available for human consumption, sanitation, and fire protection.	Please see response to comment 608-1.
608	5	Given the interconnected nature of the economy within the Bay Area and BAWSCA service area, Milpitas will be impacted by water shortages on the San Francisco Regional Water System resulting in economic and environmental impacts to neighboring communities and the Bay Area as a whole.	Please see response to comment 608-1. Please also see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, for a discussion regarding economic considerations, growth effects, environmental effects based on a rationing-only approach, and demand management.
608	6	<p>Milpitas serves water to over 14,300 residential customers and over 2,700 businesses and other non-residential customers. Potential consequences of the SED proposal include health and safety concerns due to lack of potable supplies, major job losses, slower economic growth and delayed community development in Milpitas’ service area, which were not adequacy analyzed in the SED.</p> <p>Since outdoor use represents a relatively small proportion of Milpitas’ commercial, industrial, and institutional account water demand, commercial, industrial, and institutional customers generally have fewer opportunities to reduce water use without changing their operations or incurring significant economic impacts.</p>	Please see responses to comments 608-1 and 608-5. Please also refer to Master Response 2.1, Amendments to the Water Quality Control Plan, for additional discussion regarding health and safety and the emergency provision. Please also see Master Response 3.6, Service Providers, for a discussion of Water Code Section 106 and water for minimum health and safety needs.
608	7	In the light of these aforementioned impacts as well as those articulated in the BAWSCA and SFPUC comment letters incorporated by reference, Milpitas requests that environmental	Please see responses to comments 608-1, 608-5 and 608-6. To the extent that this comment letter raises similar issues or the same issues raised by SFPUC or BAWSCA, please refer to letter 1166 or letter 1191 to

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		and economic impacts of any shortage on the San Francisco Regional Water System, and the associated lost jobs and delayed development, be fully and adequately analyzed as part of the SWRCB's proposed flow alternatives. Such full and adequate analysis should be given at least equal weight with all other elements of the SWRCB's subsequent deliberations and decision making.	review responses to those letters.
608	8	The Governor has indicated his strong support for negotiated voluntary agreements to resolve these issues. Milpitas requests that the SWRCB provide adequate time for a voluntary agreement to be reached amongst the stakeholders prior to any action on the SED. Please give this settlement process a chance for success, instead of expediting the implementation of the current proposal. Milpitas shares BAWSCA's commitment to continue working closely with the diverse interests and stakeholders to develop that shared solution.	Please see Master Response 1.1, General Comments, for information regarding voluntary agreements and collaboration with agencies.
609	1	As a wholesale customer of SFPUC that purchases approximately 12% of its potable water supply from the San Francisco Regional Water System, water supply available to City of Santa Clara under the SED proposal could be reduced more than 50% under drought conditions for multiple consecutive years.	Please see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, regarding the State Water Board's evaluation of potential reductions in water supply and associated economic considerations and other impacts within the SFPUC Regional Water System (RWS) service area with implementation of the plan amendments. The master response identifies the main points of disagreement or differing assumptions between the SED and the comments. As described in Master Response 8.5, the SED identified reasonably foreseeable actions that could be taken by affected entities to comply with the plan amendments and in response to reduced surface water supplies. These actions did not include the severe mandatory rationing described by SFPUC because it was not reasonably foreseeable that a water supplier would impose drastic mandatory water rationing on its customers without first attempting other actions to replace any reductions in water supplies with alternative sources of water, such as through water transfers.
609	2	<p>The City of Santa Clara also purchases surface water from the Santa Clara Valley Water District (SCVWD), whose imported and local supplies would also be subject to potentially significant reductions in a drought.</p> <p>Such reductions in water supply from the SFPUC may force the City of Santa Clara to use more local groundwater supplies. Since groundwater recharge is largely dependent on managed programs from SCVWD, additional groundwater pumping could have potentially significant undesirable results, such as groundwater overdraft, seawater intrusion, and land subsidence, which were not adequately analyzed in the SED.</p>	Please see 609-1. Please also see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, regarding groundwater use. Finally, please also see Master Response 1.1, General Comments, for a general discussion as to the approach to the analyses contained in the SED, and the programmatic nature of analysis, and Master Response 8.5, for a more specific discussion of programmatic analysis.
609	3	<p>The City of Santa Clara has made significant strides in water conservation in the past 15 years. Residential per capita water use decreased 46% from 112 gallons per capita per day (gpcd) to 60 gpcd.</p> <p>With reductions in supply from SFPUC the City of Santa Clara will begin to run a supply deficit with demand exceeding supply starting in 2035. The availability of additional groundwater and imported water from SCVWD will be negatively impacted due to increased demands from other agencies under SED.</p>	Please see response to comment 609-1 and 609-2. The State Water Board acknowledges the City of Santa Clara's water conservation effort and ongoing commitment to demand management.
609	4	<p>Given the interconnected nature of the economy within the Bay Area and BAWSCA service area, the City of Santa Clara will be impacted by water shortages on the San Francisco Regional Water System resulting in economic and environmental impacts to neighboring communities and the Bay Area as a whole.</p> <p>The City of Santa Clara serves water to more than 120,000 residential customers and over</p>	Please see response to comment 608-1. Please also see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, for a discussion regarding economic considerations, growth effects, environmental effects based on a rationing-only approach, and demand management. Please also refer to Master Response 2.1, Amendments to the Water Quality Control Plan, for additional discussion regarding health and safety and the emergency provision. Please also see Master Response 3.6, Service Providers, for a discussion of Water Code Section 106 and water for minimum health

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		<p>3,000 businesses and other non-residential customers. Potential consequences of the SED proposal include health and safety concerns due to lack of potable supplies, losses in job creation, slower economic growth and delayed community development in the City of Santa Clara service area, which were not adequately analyzed in the SED.</p> <p>Since outdoor use represents a relatively small proportion of the City of Santa Clara's commercial, industrial, and institutional account water demand, these customers generally have fewer opportunities to reduce water use without changing their operations or incurring significant economic impacts.</p>	<p>and safety needs.</p>
609	5	<p>The City of Santa Clara requests that environmental and economic impacts of any shortage on the San Francisco Regional Water System, and the associated lost jobs and potential delayed development, be fully and adequately analyzed as part of the SWRCB's proposed flow alternatives. Such full and adequate analysis should be given at least equal weight with all other elements of the SWRCB's subsequent deliberations and decision making.</p>	<p>Please see responses to comments 609-1 and 608-4. To the extent that this comment letter raises similar issues or the same issues raised by SFPUC or BAWSCA, please refer to letter 1166 or letter 1191 to review responses to those letters.</p>
609	6	<p>The Governor has indicated his strong support for negotiated voluntary agreements to resolve these issues. The City of Santa Clara requests that the SWRCB provide adequate time for a voluntary agreement to be reached amongst the stakeholders prior to any action on the SED.</p> <p>Please give this settlement process a chance for success, instead of expediting the implementation of the current proposal. The City of Santa Clara shares BAWSCA's commitment to continue working closely with the diverse interests and stakeholders to develop that shared solution.</p>	<p>Please see Master Response 1.1, General Comments, for information regarding voluntary agreements and collaboration with agencies.</p>
610	1	<p>As a wholesale customer of SFPUC that purchases 100% of its potable water supply from the San Francisco Regional Water System, water supply available to the City of Millbrae under the SED proposal could be reduced more than 50% under drought conditions for multiple consecutive years.</p>	<p>Please see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, regarding the State Water Board's evaluation of potential reductions in water supply and associated economic considerations and other impacts within the SFPUC Regional Water System (RWS) service area with implementation of the plan amendments. The master response identifies the main points of disagreement or differing assumptions between the SED and the comments. As described in Master Response 8.5, the SED identified reasonably foreseeable actions that could be taken by affected entities to comply with the plan amendments and in response to reduced surface water supplies. These actions did not include the severe mandatory rationing described by SFPUC because it was not reasonably foreseeable that a water supplier would impose drastic mandatory water rationing on its customers without first attempting other actions to replace any reductions in water supplies with alternative sources of water, such as through water transfers.</p>
610	2	<p>The City of Millbrae has made significant strides in water conservation in the past 10 years. Residential per capita water use decreased 36% from 81 gallons per capita per day (gpcd) to 52 gpcd.</p>	<p>This comment provides information on residential per capita water use reduction for the City of Millbrae over the past decade but does not raise significant environmental issues or make a general comment regarding the plan amendments. The State Water Board acknowledges the City of Millbrae's water conservation effort and ongoing commitment to demand management.</p>
610	3	<p>Based on the City of Millbrae 2015 Urban Water Management Plan, this significant cut in water supply could force the City of Millbrae to take a number of significant actions including, but not limited to, implementing a moratorium on new water meters and developments, evaluating sources for imported water, implementing water use reduction allocations, and prohibiting or minimizing nonessential uses of water so that water is available for human consumption, sanitation and fire protection.</p>	<p>Please see response to comment 610-1.</p>

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610	4	<p>The City of Millbrae serves water to approximately 22,000 residential customers and over 300 businesses and other non-residential customers. Potential consequences of the SED proposal include health and safety concerns due to lack of potable supplies, major job losses, slower economic growth and delayed community development in the City of Millbrae service area.</p> <p>Since outdoor use represents a relatively small portion of the City of Millbrae’s commercial, industrial and institutional account water demand, commercial, industrial and institutional customers generally have fewer opportunities to reduce water use without changing their operations or incurring significant economic impacts.</p>	<p>Please see responses to comment 610-1. Please refer to Master Response 2.1, Amendments to the Water Quality Control Plan, for additional discussion regarding health and safety and the emergency provision. Please also see Master Response 3.6, Service Providers, for a discussion of Water Code Section 106 and water for minimum health and safety needs. Please also see Master Response 8.5, regarding economic considerations, growth effects, and demand management.</p>
610	5	<p>In lights of the aforementioned impacts as well as those articulated in the BAWSCA and SFPUC comment letters incorporated here by reference, the City of Millbrae requests that environmental and economic impacts of any shortage on the San Francisco Regional Water System, and the associated lost jobs and delayed development, be fully and adequately analyzed as part of the SWRCB’s proposed flow alternatives. Such full and adequate analysis should be given at least equal weight with all other elements of the SWRCB’s subsequent deliberations and decision making.</p>	<p>Please see responses to comments 610-1 and 610-4. Please also see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, for a discussion regarding economic considerations, growth effects, environmental effects based on a rationing-only approach, and demand management. To the extent that this comment letter raises similar issues or the same issues raised by SFPUC or BAWSCA, please refer to letter 1166 or letter 1191 to review responses to those letters.</p>
610	6	<p>The Governor has indicated his strong support for negotiated voluntary agreements to resolve these issues. The City of Millbrae requests that the SWRCB provide adequate time for a voluntary agreement to be reached amongst the stakeholders prior to any action on the SED. Please give this settlement process a chance for success instead of expediting implementation of the current proposal. The City of Millbrae shares BAWSCA’s commitment to continue working closely with the diverse interests and stakeholders to develop that shared solution.</p>	<p>Please see Master Response 1.1, General Comments, for information regarding voluntary agreements and collaboration with agencies.</p>
611	1	<p>As a wholesale customer of SFPUC that purchases 100% of its potable water supply from the San Francisco Regional Water System, water supply available to Redwood City under the SED proposal could be reduced more than 50% under drought conditions for multiple consecutive years.</p>	<p>Please see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, regarding the State Water Board’s evaluation of potential reductions in water supply and associated economic considerations and other impacts within the SFPUC Regional Water System (RWS) service area with implementation of the plan amendments. The master response identifies the main points of disagreement or differing assumptions between the SED and the comments. As described in Master Response 8.5, the SED identified reasonably foreseeable actions that could be taken by affected entities to comply with the plan amendments and in response to reduced surface water supplies. These actions did not include the severe mandatory rationing described by SFPUC because it was not reasonably foreseeable that a water supplier would impose drastic mandatory water rationing on its customers without first attempting other actions to replace any reductions in water supplies with alternative sources of water, such as through water transfers.</p>
611	2	<p>Redwood City has made significant strides in water conservation in the past 16 years. Residential per capita water use decreased 44% from 91 gallons per capita per day (r-gpcpd) to 51 r-gpcpd, and gross per capita potable water use has decreased 45% from 139 gpcpd to 76 gpcpd.</p>	<p>This comment provides information on residential per capita water use reduction for Redwood City over the past 16 years but does not raise significant environmental issues or make a general comment regarding the plan amendments. The State Water Board acknowledges Redwood City’s water conservation effort and ongoing commitment to demand management.</p>
611	3	<p>Based on Redwood City’s 2015 Urban Water Management Plan, this significant cut to water supply would force Redwood City to take a number of significant actions including, but not limited to; prohibiting outdoor irrigation with potable water, a moratorium on new water connections and development, reducing water system pressure, suspending all flushing activities, implement mandatory water allocations with severe penalties including reducing residential and commercial uses more than 50%, and to minimize nonessential uses of</p>	<p>Please see response to comment 611-1.</p>

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		water so that water is available for human consumption, sanitation, and fire protection.	
611	4	Redwood City serves water to 87,000 residential customers and over 2,500 businesses and other non-residential customers. Potential consequences of the SED proposal include health and safety concerns due to lack of potable supplies, major job losses, slower economic growth and delayed community development in Redwood City's service area. It is likely that further environmental impacts will result due to the displacement of jobs and residents to other parts of California should Redwood City not have the water resources to continue to support our community, and Redwood City feels these impacts should be evaluated as well.	Please see response to comment 611-1. Please also refer to Master Response 2.1, Amendments to the Water Quality Control Plan, for additional discussion regarding health and safety and the emergency provision. Please also see Master Response 3.6, Service Providers, for a discussion of Water Code Section 106 and water for minimum health and safety needs. Please also see Master Response 8.5, regarding economic considerations, growth effects, and demand management. Please see Master Response 6.1, Cumulative Analysis, for a discussion of growth inducing effects and housing factors. Similarly, the types of jobs and economic activity associated with the Bay-Area would continue to attract people and the plan amendments would not have an effect on this attraction. As noted in Master Response 8.5, there was no discernible downturn in regional economic activity and housing permits throughout the region generally continued to increase during the recent drought.
611	5	In Chapter 22 of the current draft of the SED it states several water supply management alternatives for urban water suppliers in response to reduced surface water supplies including; expanding ground water pumping and recharge in place of surface water use, developing recycled water sources, purchasing water from other parties, and water conservation. Redwood City has invested heavily in water conservation, and recycled water to increase our supplies of drinking water, and there may not be much room for growth beyond what is currently planned for these sources. Redwood City has also investigated the use of groundwater as a domestic supply, finding that the aquifer and groundwater quality within our jurisdiction would require considerable treatment with relatively small amounts of supply.	Please see response to comment 611-1.
611	6	Chapter 22 appears to focus on the impacts to the areas directly affected by the San Joaquin River and its tributaries, and does not include environmental impacts that would be realized when Water Suppliers like Redwood City must find new sources of domestic water supplies.	Please see 611-1. Please also see Master Response 8.5, Assessment of Potential Effects on the San Francisco Bay Area Regional Water System, for a discussion regarding economic considerations, growth effects, environmental effects based on a rationing-only approach, and demand management.
611	7	Since outdoor use represents a relatively small proportion of Redwood City's commercial, industrial, and institutional water demand, commercial, industrial, and institutional customers generally have fewer opportunities to reduce water use without changing their operations or incurring significant economic impacts.	Please see responses to comments 611-1 and 611-6.
611	8	In light of these aforementioned impacts as well as those articulated in the BAWSCA and SFPUC comment letters incorporated here by reference, Redwood City requests that environmental and economic impacts of any shortage on the San Francisco Regional Water System, and the associated lost jobs and delayed development, be fully and adequately analyzed as part of the SWRCB's proposed flow alternatives. Such full and adequate analysis should be given at least equal weight with all other elements of the SWRCB's subsequent deliberations and decision making.	Please see responses to comments 611-1 and 611-4, and 611-6. To the extent that this comment letter raises similar issues or the same issues raised by SFPUC or BAWSCA, please refer to letter 1166 or letter 1191 to review responses to those letters.
611	9	The Governor has indicated his strong support for negotiated voluntary agreements to resolve these issues. Redwood City requests that the SWRCB provide adequate time for voluntary agreements to be reached amongst the stakeholders prior to any action on the SED. Please give this settlement process a chance for success instead of expediting implementation of the current proposal. Redwood City shares BAWSCA's commitment to continue working closely with the diverse interests and stakeholders to develop that shared solution.	Please see Master Response 1.1, General Comments, for information regarding voluntary agreements and collaboration with agencies.
612	1	Your plan to increase unimpaired flows in the Stanislaus River will cause far more harm than	Please see Master Response 1.1, General Comments, for responses to comments that either make a general

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		good.	comment on the plan amendments or do not raise significant environmental issues.
613	1	<p>I am asking that the flow standards be raised to a higher level than has been proposed so that enough unimpaired flow be allowed to help recover and sustain the salmon and steelhead runs. I feel that the positive ecological impact on these fish and other animals by having enough flow will be beneficial to the entire ecosystem, anglers, hikers and others who wish to enjoy the area. Current flow levels have not been sufficient to save these fish from extinction. Dedication of more water at specific times during the year is the best tactic to stop this from occurring.</p> <p>This is a golden opportunity to save our fish while still allowing enough water necessary to satisfy the agricultural community so please consider this as you discuss the new policy.</p>	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
614	1	I truly believe our beautiful Delta is on the verge of collapsing. Our California Delta can compare to any major water tributary of the world. We used to have so much wildlife that it was just awe inspiring. Now it's just hanging on by a thread. Any more diverting of our waterways can, and probably will, cause a major collapse somewhere in the Delta waterways. As a State Water Board, you have a tremendous job of trying to keep everything balanced. Please don't give in to anything that will make our waterways worse. The Delta is the blood of our land, without it we will all suffer. Please don't lose this national California treasure with all its diversity.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
615	1	I don't mean to be cute or funny, but it's almost like we're throwing so much water at the fish without regard to other water benefits. And that's how it looks out in the real world where I'm coming from, that we're almost drowning the fish by throwing so much water at them. It's not improving things. It's shown it's not improving anything, so have some real concerns about that.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
615	2	<p>I was a little surprised at the presentation towards the end with regards to groundwater, drilling more wells, drilling deeper wells. I know it's not the case, but it came across as though there was absolutely no recognition that we got SGMA moving forward. We dealt with a piece of legislation just this last year that would have forbidden drilling new wells in many of these areas.</p> <p>The Central Valley Project was built and the need was envisioned, because of decreasing groundwater. Now, in recent years for a lot of reasons we've taken away the surface water supply; in some areas 100 percent, 50 percent. We're back in the same boat and this is just compounding that, so these are very, very serious concerns. I'm not getting technical, because as you know I'm not technical. This proposal is a taking, and it's taking legal water right away.</p>	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
616	1	<p>I'm here today to represent the Board of supervisors in Merced County and also to let you know that the river, Merced River, goes through my district from one end to the other, from one side of the county to the other. I've been pleased to represent the area for 21 years and I'll be retiring at the end of this year. But I'm here to talk about some of the things that are being proposed and the concerns that our county has regarding them.</p> <p>The timing in the schedule of the release of the revised SED has created barriers for people to provide input and feedback on the proposal. Right before Christmas some of the meetings -- California State Association of Counties, California Association of Water Agencies -- are being held in Southern California. And it just makes it difficult for us to be</p>	Please see Master Response 1.1, General Comments, acknowledging the concerns of elected representatives and other community members and information regarding the extension of the public comment period.

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		<p>able to share our concerns when we have some of the elected officials and important people that are related to this project unable to attend.</p> <p>We do appreciate the addition of the public hearing in Merced. Thank you very much. And we also had, I think it was Mr. Howard who came to Merced, and we do appreciate his presentation that he made.</p>	
616	2	<p>We are still in a drought and that's one of the big impacts that we're worried about, that it hasn't been considered. I don't know what stage this drought is in, if it's a 100-year drought, if it's a 150-year drought, how long it's going to last we don't know. But it's troublesome to us, because of the groundwater impacts that we're looking at with your proposal on top of the SGMA requirements that we have.</p> <p>In our area, a lot of our groundwater basin, it's recharged by the aquifers and also by the agriculture that goes on in our area. It sinks down. Under this proposal impacts on groundwater are going to be brushed aside and we're concerned about that, because we do depend on groundwater a lot. Not just the agriculture, but the cities. We should not be punished for choosing to stay in agriculture and we do want to stay in agriculture. It's our economy. It's the main provider of tax, property tax, in our county, agriculture is. We tax every single thing related to agriculture and it funds our schools. It funds our community. It funds our county.</p> <p>Merced County has some of the oldest and most senior water rights in the State of California. This proposal impacts that. The community has developed and funded a complex water-distribution system. And we built one of the earliest reservoirs in the state that provides a reliable water supply that benefits agriculture, the economy, the cities, and the groundwater basin. Leaving an existing and available multimillion-acre-foot reservoir always close to empty is a stranded asset and a failure in water management.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues. Please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act, for additional information regarding historical groundwater use and overdraft in the plan area and SGMA. For a discussion about how a change in groundwater availability could impact agricultural economics, please see Master Response 8.1, Local Agricultural Economic Effects and the SWAP Model, and Master Response 8.2, Regional Agricultural Economic Effects.</p>
616	3	<p>While the SED Economic Analysis shows an economic impact of 433 job losses, and a \$64 million impact to the regional economy over three counties, two other independent economic analyses tell a different story. These independent analyses show approximately 900 jobs lost in Merced County alone and economic impacts closer to 231 million.</p>	<p>Please see Master Response 8.2, Regional Agricultural Economic Effects, for a discussion of anticipated employment effects (also disclosed in Chapter 20, Economic Analyses) and the method(s) used to assess regional economic effects. To review responses to comments submitted by other entities within the comment period on the 2016 Recirculated Draft SED, please refer to the index of commenters in Volume 3 to locate the letter number(s) of interest.</p>
617	1	<p>[Merced Soccer Academy] players come from all kinds of families with parents that are firefighters, teachers, and lawyers, but a high percentage of our players come from families whose parents work in factories or are field workers. The majority of our kids live in what we would consider the other side of the tracks and from low-income families. The fact is all of our youth are at a disadvantage. Their community is overrun with gangs, drugs, and crimes, there are few jobs. This is their daily reality. From my view, our entire community is in the wrong side of the tracks. There is nowhere to go. Our kids must live with adult negative influence in their lives. So now, because you are deciding of cutting our water supply what does that say about their future? Tell me?</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
617	2	<p>But I'm hoping with this over 700 signatures it brings an awareness of our concerns. You are the decision makers. I need to know how I can go back to my community and tell them we want to have less water. Right now we are losing hundreds of trees. Our gardens are dry. And now, how I can go and talk with these kids, how I can go and talk with these families, "Look, they're already taking water from us, but they want to take even more water."</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>

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617	3	<p>During this time as a volunteer coach we [Merced Youth Soccer Academy] have had a dream of building a soccer complex like in other cities. Until now we have not been able to do and with what you are proposing, it will be harder.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
617	4	<p>I want to make sure that you understand that those over 800 signatures I delivered to you in Sacramento are an example of some of the hard-working people of Merced County. I am here today to again let you know that the over 4,500 parents, soccer players, and families in the soccer academy are against your proposed plan. Most of these families have 6-5 jobs and are not able to be here today.</p> <p>You make decisions without taking us into account ... we are here today because we do count and it's going to impact us a lot!</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
617	5	<p>Our trees are dying and many other living things are being affected by the lack of water; thousands of trees have died and continue to die because there is not enough water, so you are directly affecting the standard of living of our communities with this proposal. In essence, what you are doing is taking from Peter to pay Paul--taking water from our community to pay to other communities. In the long run you are adding to the problem.</p> <p>Therefore, I am asking you to reconsider your proposal and find another way that will not damage the future of our youth. You might even consider the MID S.A.F.E. plan. Thank you for allowing me to speak.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
618	1	<p>We are community [city of Merced] that is just enjoying coming out of recession while other communities have experienced that turnaround. We are also a community that has been fighting double-digit unemployment for a number of years.</p> <p>The Plan as proposed, based on an independent economic study, will impact our area by \$231 million. This represents job losses between 900 to 1,000. That's another additional point that we will have to combat and find and generate other jobs within the community. We are seeing a trend, residents are moving from high-priced coastal areas to the Inland areas. The question is, as they come in and we build more housing, are we going to have sufficient water supplies to serve the new residents that come into our areas?</p> <p>Also, I work with a number of food processors looking to bring job-generating opportunities to our community and also continue to hold California's economy as the 6th largest within the world. Without water we are having to turn away these particular food-processing industries and other wet users that are contemplating the Valley and Merced as their home. Thus we're having to turn away jobs. That's something that we don't want to have to do.</p> <p>We've been blessed with UC Merced put in our community. They are aggressively working on a 20-20 Expansion Plan. Imagine this, 1.3 million square feet of new construction, over a billion dollars of industry -- or excuse me, a billion dollars being invested into the community through the Plan. However, will we be able to accommodate the 10,000 students that it will ultimately serve without there being adequate water resources? We are concerned as a community for water quality, for quality of life. We are concerned for our economy, because while we are heavily dependent upon agriculture the lifeline of any economy is water.</p>	<p>Please see Master Response 3.6, Service Providers, for discussion of the availability of municipal water supplies. Also, please see Master response 8.2, Regional Agricultural Economic Effects, for discussion of the economic analysis performed by Merced Irrigation District and for discussion of the potential economic effects on food processors.</p>
619	1	<p>As you're aware there's about 350,000-acre-feet of water that could possibly just go pour the fish out to the ocean. There's been a lot of water go to the ocean in our view, over the</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general</p>

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		last couple of years, because we weren't able to pump that water down into San Luis.	comment on the plan amendments or do not raise significant environmental issues.
619	2	I very appreciate your staff's presentation here today, because it's the first time I've heard it about settlement agreements, which I think are just critical to manage the water in the state. Especially since we don't have any more storage. We're wanting to use all this water and we haven't built any more storage to manage it.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
619	3	I also want to also remind you that the cumulative effect of all the regulations this state has on agriculture will surely see a decrease in agriculture. We're looking at probably 800 small farms disappearing, once this gets implemented if it isn't changed.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
620	1	<p>I'm a fulltime fishing guide for the last 20 years here in the Central Valley on the rivers and the Delta.</p> <p>And my industry is in disrepair right now. It's in total collapse and that is due to our epic failure of the fish runs these days, as you guys alluded to earlier. And that is most -- the main reason for that is our lack of water. We can't have fish without water in the rivers. And so I have had to move my operations to Alaska and I'm also considering moving out of state, because I can't sustain my livelihood here anymore.</p> <p>And I'm a small fish, obviously. I'm one guy, but one guy I have clients who fly in from out of town, so I leave we don't have any more people flying into town. So you have airline tickets. You have restaurants the people eat at that come fish with me, the hotels, a bunch of local businesses. I have \$100,000 worth of boats that I bought at local dealerships, a \$50,000 truck. All this stuff that adds up and it's a trickledown effect. So just, I go away I guess it seems small potatoes, but it's a big ripple down.</p> <p>I go to the tackle shop and spend tens of thousands of dollars it seems like every year. I talked to the local owner of the tackle shop here in Sacramento, the manager. He said when we had closed salmon fishing a few years ago his shop lost a million dollars. That's one shop. So there's more than just -- you know, I hear refer to it, "Oh, they're just stupid fish," and all that. It's a lot more than that. And so it's one of those thing that I think we need to look at the bigger picture. There's a lot more to this than just fish versus farms. I mean, we all need to get along here obviously.</p> <p>So the real thing though is if I go away I'm just a small cog in a \$1.4 billion salmon fishing industry in California. That's with a "b" billion and those are 2006 numbers, unfortunately. That's the current numbers we have right now, but 1.4 billion, that's a big number. And so if I'm thinking about moving completely out of state how about everybody else in my industry? That's a big hit to the state, so that's just something to kind of think about. It's more than just fish.</p>	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
620	2	And then a quick biology lesson, most people know that Salmon die after spawning in the river, right? But do you know why? It's because they're bringing the carbon and the protein from the ocean back to the relatively sterile Inland environment, which gives the Basin a whole shot of protein and food. So it's more than just the fish, it's more than people, it's more than the farms, it's just a big, big picture.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
621	1	It's [the Delta] the heart and hub of our water system and it serves a critical role in the state and protecting it is paramount.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.

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		<p>We appreciate the Board's efforts and think that instream flow proposals are the right way to go and are happy that this is moving forward after quite some time. But we are concerned that it's going to be insufficient as proposed. I think we've seen with the information today that at the 60 percent level there were much better performances of species on the tributaries than at the 40 percent. And we're concerned that if we set the lower standard that we're going to go through all this process and exercise only to see that it might not work.</p> <p>And so given the need to prevent an unsustainable amount of diversions from these streams we think going to the more protective standard that is backed by the science would be the smarter alternative in seeing how that affects the ecosystem.</p>	
622	1	<p>NRDC believes that we do have an opportunity right now to significantly improve conditions and to finally achieve the salmon doubling goal that's been enshrined in the Water Quality Control Plan for more than 20 years. Unfortunately, as we review the document -- and this is still work in progress as we continue to review the document -- we find three major flaws.</p> <p>The Substitute Environmental Document fails to demonstrate that it's likely to achieve the existing plans, the salmon doubling objective. The second is that the Board cannot legally balance away achieving that objective. It has to consider things like improved water use efficiency, water recycling, and habitat restoration and water transfers in any balancing. Third the Program of Implementation is substantially flawed and provides too much discretion regarding the flow volumes, shaping, and shifting of flows, and an unworkable governance scheme that means that the objectives are unlikely to be achieved.</p>	<p>Please see Master Response 1.2, Water Quality Control Planning Process, for responses to comments regarding consideration of beneficial uses. Please see Master Response 2.1, Amendments to the Water Quality Control Plan, for additional information regarding the salmon doubling objective, Program of Implementation, adaptive implementation methods, the Stanislaus, Tuolumne, Merced Working Group, and Biological Goals. Please see Master Response 2.2, Adaptive Implementation, for responses to comments regarding flow shaping, shifting flows, and governance. Please see SED Chapter 19 and Master Response 3.1, Fish Protection, for information about LSJR plan amendments and benefits to fish.</p>
622	2	<p>More than 20 years ago this Board adopted a salmon doubling objective, which staff alluded to earlier today. Which states that, "Water quality conditions shall be maintained, together with other measures in the watershed, sufficient to achieve doubling of natural production of Chinook salmon from the average production of 1967 to 1991, consistent with the provisions of State and federal law." [ATT:1, ATT:3] And this was intended not to restore the historic abundance of salmon in these tributaries and elsewhere in the system, but to increase populations so that we could have sustainable fisheries for the long term.</p> <p>Under state law the Water Board is charged with developing Water Quality Control Plan and the Program of Implementation must demonstrate how it will achieve those water quality objectives. More than ten years ago, the Court of Appeal held that the time for determining what was necessary to achieve the salmon doubling objective was when they formulated the Bay-Delta Plan, both in 1995 and when they revisit that plan. [ATT:1, ATT:4] And that is our new opportunity today.</p> <p>It's very clear that we are failing to meet the salmon doubling objective. The Board approved the Vernalis Adaptive Management Program, which was an experimental program that provided flows lower than what was required for in the 1995 Water Quality Control Plan. [ATT:1, ATT:5] In 2006, more than a decade ago, the California Department of Fish and Wildlife comments that the Plan was failing to achieve salmon doubling, that salmon was declining, and that there was substantial evidence that the declines were due to inadequate spring flows.</p>	<p>Please see Master Response 1.2, Water Quality Control Plan Process, regarding the process of the plan update. Please refer to Master Response 2.1, Amendments to the Water Quality Control Plan, regarding the salmon doubling goal. Please refer to Master Response 3.1, Protection of Fish and Wildlife regarding the scientific basis for the plan amendments.</p>
622	3	<p>All of us believe that there are other factors that affect salmon, both within the watershed and outside the watershed, and our focus really is on maintaining those conditions within the watershed that are necessary in the tributaries and lower river, necessary to achieve</p>	<p>Please see Master Response 3.1, Fish Protection, for information regarding biological goals, including the population doubling objective, expected benefits of a more natural flow regime, and other factors considered, including ocean conditions. Also refer to Master Response 2.2, Adaptive Implementation, for</p>

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		<p>salmon doubling.</p> <p>So when you look at a graphic like this [ATT:1, ATT:6], which is the Salmon Doubling Chart for the Tuolumne River comparing that baseline period average of 18,949 fish with the Anadromous Fish Restoration Program doubling target of nearly 38,000, and you see this decline, obviously that's not due solely to conditions in the tributaries. For instance, in 2008-2009 we saw bad ocean conditions, which contributed to and in synergy with bad conditions in the rivers, led to the collapse of the fishery.</p> <p>We need to revise the water quality objective and the Adaptive Management Program in the SED to be consistent with the existing salmon doubling objective. Right now the narrative objective for this proceeding is a much vaguer standard that doesn't actually explicitly tie to the salmon doubling objective, nor does the Adaptive Management and Program of Implementation do so.</p>	<p>further discussion of adaptive implementation of the more natural flow regime.</p>
622	4	<p>The Substitute Environmental Document fails to demonstrate that the flow and non-flow measures are actually likely to achieve the salmon doubling objective, at least provide the conditions necessary to do so. [ATT:1, ATT:7]</p>	<p>Please see Master Response 3.1, Fish Protection, for information regarding justification and description of the plan amendments for protecting fish, expected benefits of the more natural flow regime, and discussion of biological goals.</p>
622	5	<p>The Board does need to balance the different beneficial uses of water, but it does so in developing the objectives. [ATT:1, ATT:8] It cannot balance away meeting the objectives in the Plan. And when you consider balancing you have to consider not just the impacts, but also the benefits of flows such as improved water quality in fisheries as well as considering alternative water supplies.</p> <p>In 2013 we provided comments, technical comments, regarding improvements in water use efficiency, for ag. We will obviously do the same for communities like San Francisco and the Peninsula that rely on water where there are huge opportunities to invest in alternative supplies.</p>	<p>Please see Master Response 1.2, Water Quality Control Planning Process, for responses to comments regarding the State Water Board's consideration of beneficial uses within the context of the water quality control planning process.</p>
622	6	<p>The Water Board does have the authority in this proceeding to require investments in habitat restoration and other measures to achieve the Plan objectives, particularly where that reduces the water cost.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues. Please refer to the sections describing the authority of the State Water Resources Control Board and non-flow measures. Please see Master Response 5.2, Incorporation of Non-Flow Measures, for responses to comments regarding non-flow actions.</p>
622	7	<p>There has been a lot of commentary that this is really part of the Delta Tunnels Plan. NRDC strongly opposes that plan. And as we had noted several years ago, under California law the water users here that might have to give up flow can prevent the export users from diverting that flow by dedicating it to in-stream use, or by reaching a transfer agreement to sell some of it and invest in water supply alternatives locally and in improvements in efficiency and storage.</p>	<p>Please see Master Response 1.1, General Comments, for information related to the California WaterFix as well as a discussion regarding exports.</p>
622	8	<p>We have major concerns with the Program of Implementation and the excessive discretion that's provided there. Things like the annual decisions on the percentage of unimpaired flow aren't sufficiently tied to achieving the objectives and the salmon doubling objective. Decisions on flow shaping aren't even analyzed in the SED. The discretion allowed here would allow you to reduce flows for four months and then dump them all in the last month. You need to have much tighter rules on that and shifting flows to the fall months is incredibly damaging in terms of achieving improvements in spring flows. And we encourage</p>	<p>Please refer to Appendix K, Adaptive Methods, and Master Response 2.2, Adaptive Implementation, for information and responses to comments regarding February through June Flows. Any changes in flows must satisfy the following criteria for adaptive adjustments:</p> <p>"(1) it will be sufficient to support and maintain the natural production of viable native San Joaquin River watershed fish populations migrating through the Delta; and (2) it will meet any existing biological goals approved by the State Water Board."</p>

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		you to drop that entirely.	<p>Decisions on flow shaping need not be analyzed in the SED because the decisions will not result in a change in environment different from the range of flows already analyzed.</p> <p>Shifting flows to periods outside the February through June period is already limited in the program of implementation to amounts in excess of 30 percent of unimpaired flow. Dropping this provision would unnecessarily constrain the ability to provide flows at times when they may most be needed to reasonably protect fish and wildlife (i.e. for maintain adequate cold water pool in reservoirs for temperature control).</p> <p>Master Response 2.2, Adaptive Implementation, provides additional description and examples of how adaptive management may proceed and the bounds under which it may do so.</p>
622	9	NRDC does not support the existing proposal, we believe it's inadequate. We encourage you to revise the Substitute Environmental Document to explicitly incorporate salmon doubling into both the new objective in the Plan as well as the Program of Implementation. To limit the discretion in the Adaptive Management Implementation Program, so that you really are tied to achieving those biological objectives, but you're not creating a governance scheme that's going to expend a lot of energy every year without really thinking through what data is available to make those decisions. And then finally ensure that whatever flow alternative and non-flow alternative you, the Board, adopts will actually achieve those necessary conditions in the river.	<p>Please see Master Response 2.1, Amendments to the Water Quality Control Plan, and Master Response 3.1, Protection, for information regarding the benefits of the plan amendments. Please see Master Response 2.1, Amendments to the Water Quality Control Plan, for responses to comments regarding LSJR plan amendments and reasonable protection of fish and wildlife beneficial uses, the purpose and goals of the amendment and additional information about the salmon doubling objective, biological goals and the program of implementation. Please also refer to the San Joaquin River Monitoring and Evaluation Program.</p> <p>Please see Master Response 1.1, General Comments, for a discussion on adaptive implementation and non-flow alternatives for protecting beneficial uses of water.</p>
622	10	In the short presentation formats it can be really easy to just jump to all of the key points that we're really hoping you swallow. But I do want to take a minute to just acknowledge all the work that's been done, say a number of the comments that TU included in our last round of comments including a request for a robust adaptive management process that includes a range of stakeholders appeared in this new document, and we are really appreciate of that. And of all the energy that's been put into this process, so thank you.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues or make a general comment regarding the plan amendments. Discussion of responses to the 2012 Draft SED can be found in the Draft Revised SED Executive Summary, ES 3.3, Recirculated CEQA Document.
622	11	<p>The key points basically all revolve around how essential it is that the proposed flows support the conditions required by fish populations. Those fish population targets have been established by CVPIA and what we're really looking for when we review the SED is, is there compelling scientific evidence that the proposed flows will meet the fishes needs?</p> <p>And in order for that to occur, and to make that transparent, we really would like to see those flows evaluated against quantitative, science-based objectives for what habit conditions and biological population-related conditions are indicative of success relative to the CVPIA targets.</p> <p>The second point I'm going to make in the presentation, and that I want you to retain is that quantitative objectives related to those things already exist. There's really great ones in the Central Valley Flood Protection Plan appendix. While you all have been doing your work, a number of the NGOs, the state agencies, and initially some of the water districts worked on objectives for the Stanislaus River that are now available. The EPA has temperature objectives, so there are a bunch out there that can be used right away to reveal the extent to which the proposed flows are or are not effective at meeting the needs of fish.</p>	Please refer to Master Response 3.1, Fish Protection, regarding adequacy of modeling to support the analysis and for justification and description of the Plan Amendments for protecting fish. Also see Master Response 1.2, Water Quality Control Planning Process, regarding the peer review process of the Scientific Basis report (Appendix C, Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives).
622	12	The big reasons for applying the objectives are not just to make sure that the proposed flows meet the needs of fish, but also to constrain flow management so that it's always maximized for biological benefit. And also to facilitate the integration of this process with all of the other regulatory processes that are going on and are going to need to come together	Please see Master Response 2.1, Amendments to the Water Quality Control Plan, for responses to comments regarding Biological Goals and the Program of implementation. Additional discussion of biological goals can be found in Master Response 3.1, Fish Protection. Additionally, Master Response 2.2, Adaptive Implementation, the Executive Summary and Appendix K, describes the STM Working Group which will aid in

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		in order for us to be successful.	guiding flow management.
622	13	Proposed flows should support conditions required by fish populations. [ATT:3, ATT:1] Fish habitat is composed of many components, it's not just water obviously, it's vegetation, it's substrate. And in order for a fish population to be successful all of those conditions need to be met and they need to be met for the varying needs of each of the individual life history stages. So flow is a very important variable.	Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.
622	14	Objectives allow us to quantify established targets and provide a basis for monitoring progress towards achieving the habitat conditions. And then as an expression of those habitat conditions, the population success in the fish that we're hoping for. [ATT:3, ATT:1] So last time I sat with you all and we talked about this I showed a picture of "Field of Dreams" and said, "If you don't build it, they won't come." And now, you know, we're talking about building it and that's real exciting. We just want to figure out okay, if we want to attract baseball players let's not build a football stadium. So the objectives are important.	Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.
622	15	Objectives also facilitate is highlighting habitat needs that aren't achievable with water, so that we can achieve them in other ways. So the one thing that would be a terrible outcome of this process given the Board's focus on water is if we developed flow proposals that actually didn't get us what we needed for the fish and used a lot of water in the process. And I think it's going to have to be an interaction between flow and non-flow actions that achieve that wet habitat, you know, that involves veg and soil that gives the fish what they need.	The State Water Board recognizes the importance of implementing non-flow measures to recover and support salmon populations. Please refer to Master Response 5.2, Incorporation of Non-Flow Measures regarding the role of non-flow measures in the plan amendments. For further discussion on State Water Board's authority related to non-flow measures and the incorporation of non-flow measures into the plan amendments; please see Master Response 5.2, Incorporation of Non-Flow Measures.
622	16	Knowing where the flows are not doing the work, so that we can evaluate whether there are physical things we can do on the ground to make up that difference is a really important part of applying objectives to the flow proposals. And as I mentioned before they also serve as a framework to link actions. You know, in some beautiful future your actions, the FERC processes, the Central Valley Flood Protection Plan, CVPIA and the NMFS recovery plans are all working around a common set of objectives to provide the water, the infrastructure, the habitat necessary to recover salmon. And to do those in a way that are balancing those needs with the needs of the working landscape from the headwaters down to the Delta. And, you know, that integrated vision is certainly away off, but the first step towards it I think is in each of the different processes creating a transparent set of objectives that we all can point to and identify the sort of subset that that regulatory process is addressing or working towards. And without that integration fish recovery is doomed, you know, I think. So there's a real need for us to get together and do that, but fortunately as I mentioned before, a lot of objectives have already been developed. There's a list of them here.	Please refer to Master Response 3.1, Fish Protection, regarding the purpose of the plan amendments and the narrative objective, and regarding justification and description of the plan amendments for protecting fish. Also refer to Master Response 1.1, General Comments, regarding description and objectives of the plan amendments, relationship of the plan amendments with other plans and programs, State Water Board authorities, and the planning horizon. See Master Response 1.2, Water Quality Control Planning Process, regarding the peer review process of the Scientific Basis Report (Appendix C, Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives), and for further discussion of State Water Board authorities. Refer to Master Response 2.1, Amendments to the Water Quality Control Plan, for additional discussion of objectives of the unimpaired flow requirements.
622	17	I especially want to call your attention to the Science Evaluation Panel objectives, which we have a workshop scheduled with you all in February to present to you in detail. The Central Valley Flood Protection Plan has an appendix that does an analysis of habitat needs for salmon across all of the tributaries -- all of the rivers within the Central Valley -- at least so far as they're in the state system of flood control. And provides habitat metrics that could be applicable to your flow measures and you'll hear some about some work that we've done with those presented by my colleague, Jon Rosenfield. The NMFS Recovery Plan has objectives and the EPA and DFW also have temperature objectives that can be applied to evaluate different flow proposals.	The State Water Board used the best available science throughout the SED. Please see Master Response 3.1, Protection of Fish and Wildlife, regarding the use of best available science and considerations of other information. Master Response 3.1 also includes a discussion regarding biological goals. As discussed in Chapter 7, Aquatic Biological Resources, the U.S. EPA's water temperature criteria was used to evaluate Impact AQUA-4: Changes in exposure of fish to suboptimal water temperatures resulting from changes in reservoir storage and releases and Impact AQUA-10: Changes in predation risk resulting from changes in flow and water temperature.

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622	18	<p>Objectives should be specifically applied to evaluate the sufficiency of habitat extent and quality. So for example in the new SED there's analysis, which is a great step in the right direction, using wetted acre days. On the upper San Joaquin we did some floodplain habitat analyses and we found that when you actually apply the duration of inundation necessary to make productive habitat, so let's say it's 10 days or 14 days, the depth of inundation and the velocity of inundation, you significantly shrink your wetted acre days. Then if you go out and you look on the ground at how many of those acres are actually suitable habitat acres, usually the percentage of suitability range from 7 to 33 percent. So that already reduced number then gets cut by at least two-thirds.</p> <p>So just to give you a sense, the wetted acre approach is great, but it's a massive overestimate. There are ways to make it more robust and they're pretty straightforward and based on information that's out there and available.</p> <p>MS. D'ADAMO: What is your criteria compared to staff's on the floodplain additional benefits?</p> <p>DR. HENERY: In terms of what are the --</p> <p>MS. D'ADAMO: Do you use a wetted acreage approach or do you use a different approach?</p> <p>DR. HENERY: It's essentially a wetted acreage approach. The acreage is just further filtered by depth, velocity, cover percent and type, and then an inundation duration.</p> <p>MS. D'ADAMO: And then on some of these don't you just end up needing some physical improvements.</p>	<p>Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p> <p>Please also see Master Response 3.1, Fish Protection, for responses to comments raised about floodplain habitat suitability and expected benefits from increased floodplain inundation.</p>
622	19	<p>The inundation and habitat is a combination of the shape of the river, I mean you guys heard a lot about that last time, and how much water there is. But I think what you want is an integrative plan that gets you to that objective. And if you are meeting those more specific objectives for habitat quality, you can decide is all the money spent on restoration more valuable or is it more valuable to spend the money on water and see how you can arrive at that goal?</p> <p>We just want to see that the objectives are met.</p> <p>MR. MOORE: I think this is a good discussion, because it reminds of some work I've done in habitat evaluation procedure where you look at an area, so in this case it'd be wetted acre and the time, the days. And simply as an engineer, you apply a coefficient that becomes a weighted area. And that can really help guide decision making that's collaborative with many participants present to see the transparency of where money would be spent in certain floodplain improvements, because of a better chance of having a higher weighted value for value in terms of biological outcome.</p> <p>MS. D'ADAMO: And this is an area that I think that maybe we can spend more time on in one of the technical workshops. I'm not expecting you to go out and do more work, but maybe to pull out what you already have in the SED, because for me just having been on all three rivers and spent some time, it doesn't make sense on the Merced. The Merced, you know you can put a lot of water down there, it does not just instinctively make sense that there's going to be a lot more wetted acreage.</p> <p>And so trying to sort through -- and I think it will be really helpful for the settlement process</p>	<p>Please see Master Response 3.1, Fish Protection, for responses to comments raised about floodplain, and Master Response 5.2, Incorporation of Non-Flow Measures.</p>

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		<p>anyway -- you've got a lot of that work you've already done on the Stan. But the other two rivers not as much so. And so I think it would be helpful to be able to drill down and figure out from more of a qualitative perspective on the wetted acreage analysis.</p> <p>You can use the objectives to constrain flow management in the way that Doug was describing. So it makes it really transparent if the way that you're managing flow isn't one that's optimizing the needs for fish, because you understand what those needs are in a really transparent, quantitative way.</p>	
622	20	<p>And then when you move into the adaptive management process flow objectives can serve as those adaptive management triggers. And you really need them before the adaptive management process, because they become your hypothesis that you're testing through implementation. So we can't wait for the adaptive management process to develop the objectives. We have to have some going in and then they can be refined, engaged with, in an adaptive management framework testing them as we go through the implementation process.</p>	<p>Please see Master Response 2.2, Adaptive Implementation, for responses to comments regarding adaptive management, examples of how adaptive management may proceed, and the bounds under which it may proceed. The intent of the adaptive implementation provisions of the program of implementation is to observe what can be achieved under certain flows (total February through June percent of unimpaired flow and how it is shaped), and adjust as necessary to achieve biological goals and associated measures of habitat and temperature attainment.</p>
622	21	<p>What the process should look like [ATT:3, ATT:7]: we establish objectives, flow prescriptions are developed, flow analysis is done against the objectives to see how the prescriptions work, those prescriptions are refined and the non-flow measures are developed that go with them in the case where they're not sufficient on their own. Then we start implementing, monitoring our implantation and adaptively managing to move closer to our objectives.</p> <p>And I feel like this is sort of what we've done so far. Objectives have been developed and you all have worked on flow prescriptions and to some extent tried to frame those around objectives like the example of the wetted acres days. I think this is what should be encompassed in the SED, which is the refinement, the transparency around how they reach the objective and the non-flow measures that compliment those independent of whether or not those things are going to be implemented in the context of the Board's jurisdiction. So you know that the flows you develop are actually able to meet the objectives even if there's other work that has to be done. And then this is what I see as sort of the adaptive management part.</p>	<p>Please see Master Response 2.1, Amendments to the Water Quality Control Plan, regarding a description of the plan amendments, including adaptive implementation. Please see Master Response 2.2, Adaptive Implementation, regarding the process for adaptive implementation and the inclusion of adaptive implementation in the plan amendments.</p>
622	22	<p>Our specific requests are that you develop flow prescriptions that specifically support CVPIA targets. That you include analysis of flows against existing objectives in the SED, that you refine existing wetted acre analysis to include measures of habitat quality like we were just talking about. Demonstrate that flow prescriptions are capable of achieving objectives and quantify and specify non-flow measures in the case where they're not or they need those to achieve the objectives. And then also identify objective-based flow management constraints in the SED upfront, so that when we move into that adaptive management process there's already some really good sideboards on it.</p>	<p>Please see Master Response 2.1, Amendments to the Water Quality Control Plan, regarding the salmon doubling objective. Master Response 3.1, Protection of Fish and Wildlife, regarding the justification for the unimpaired flow approach and biological goals. Please see Master Response 2.1, Amendments to the Water Quality regarding the salmon doubling goal as well as requests for other modifications to the plan amendments. Please see Master Response 2.2, Adaptive Implementation, regarding the adaptive management process. Please see Master Response 5.2, Incorporation of Non-Flow Measures regarding the role of non-flow measures and their incorporation into the plan amendments.</p>
622	23	<p>MS. D'ADAMO: Well, it seems to me that this is an area where I was just at the Delta Science Conference and our Chair did a keynote and I was just on a panel on predation. And my focus was on habitat, it really seems that what we're seeing with the evolving science is the need for habitat and maybe some predation hotspot work, but habitat. And I'm hearing you saying we need habitat as well and I was planning on asking later, but I may as well ask now. You know, we've got this slide that shows even with 40 percent of flow all we're going to see is 11,003 additional fish. And so something's missing and this is just crying out that it's</p>	<p>The State Water Board recognizes the importance of implementing non-flow measures to recover and support salmon populations.</p> <p>Please refer to Master Response 5.2, Incorporation of Non-Flow Measures regarding the role of non-flow measures in the plan amendments. For further discussion on State Water Board's authority related to non-flow measures and the incorporation of non-flow measures into the plan amendments; please see Master Response 5.2, Incorporation of Non-Flow Measures.</p>

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		<p>the habitat piece that's missing.</p> <p>And it seems to me that that's an area where we can find a lot of agreement on all sides, because we're hearing the water users saying that as well. Going through development of biological objectives and criteria, I know it took years on the Stan and the fish need the water now. And so the reason I'm hopeful, if you could get more information out now, so that it could feed into the settlement process. There just seems to be a lot of good synergy right now in the area of habitat.</p> <p>DR. HENERY: Yeah, two quick responses, one is that we definitely are actively working on the same group on the objectives for the other tributaries. And because the model for the Stan is out there now we anticipate it coming very quickly, like in months.</p> <p>And the other comment is just I completely agree on the habitat front and I feel like the opportunity there is for us to have a dialogue about the best way to achieve those habitat objectives. We'd love to get those habitat objectives into the SED, so that there can be that discourse then that's about okay can we achieve these objectives with this much water and this much work on the ground? Or does it take more water? And until that bar is transparent and everybody can look at it, it's hard to have that discussion.</p>	
622	24	<p>The Bay Institute analysis to date shows there's no evidence that flows less than 50 percent of unimpaired flow will achieve salmon doubling targets or ensure a functioning south Delta ecosystem. Even at higher flows, salmon doubling is possible only if accompanied by very precise manipulation of flow, aka flow shaping, and massive investments in physical restoration of habitat. It's not an either/or. Rearing habitat restoration is necessary. I'll say it again. Rearing habitat restoration is necessary, but at flows less than 50 percent of unimpaired flow restoration acreages that are necessary and the cost for those acreages, skyrocket.</p> <p>High temperatures limit egg incubation and juvenile rearing habitat at flows less than 50 percent of unimpaired flow. And this constrains the tributary carrying capacity and the ability to shape flows without producing negative temperature effects.</p> <p>Our analyses -- there are a variety of analyses that we'll go through quickly here. There are numerous lines of evidence that demonstrate that 40 percent of unimpaired flow is inadequate. These include strong correlations between winter-spring flows and adult escapement, correlations between winter-spring flows and juvenile survival on the tributaries. And then strong functional connections between flow and carrying capacity via its effect on temperature and inundated off-channel habitat.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments in general support of the plan amendments, a specific percent of unimpaired flow, or an LSJR alternative. Please see Master Response 2.1, Amendments to the Water Quality Control Plan, for responses to comments regarding the plan amendments and the salmon protection objective (salmon doubling). Please see Chapter 19, Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30, Section 19.2, Temperature, and Master Response 3.1, Fish Protection, regarding temperature effects under different percentages of unimpaired flow. Recent analyses on the Stanislaus River also show significant positive responses of juvenile salmon to greater cumulative discharge, greater variance in discharge, and lower water temperatures during the juvenile emigration period (Zeug et al. 2014). It is clear from studies to date on LSJR salmon populations and our current understanding of the life history and ecology of anadromous salmonids (see Appendix C Technical Report on the Scientific Basis for Alternative San Joaquin River Flow and Southern Delta Salinity Objectives) that a more natural flow regime characterized by higher, more variable winter and spring flows operates through a number of mechanisms to enhance survival, growth, and emigration success of juvenile salmonids (e.g., water temperature, food production, water quality, emigration timing, and predator-prey dynamics). Existing survival and flow relationships are based on river flows that are low and stable in the spring time period when compared to unimpaired flows. To meet the biological goals of the proposed plan amendments, the program of implementation would require higher flows that more closely mimic the natural hydrograph and provide the flexibility to respond adaptively to specific flow needs or new understanding of the mechanisms linking flow to natural salmon and steelhead production. With these changes, the potential exists for a biological response that exceeds the response based on the historical flow and survival relationships.</p> <p>Also see Master Response 5.2, Incorporation of Non-Flow Measures, regarding the role of non-flow measures and the plan amendments, as well as non-flow measure costs as they related to the plan amendments.</p>
622	25	<p>This is a graph [ATT:2, ATT:3] you've seen before and you'll see again. The green bars represent escapement of the salmon to the three tributaries and they're on the left vertical axis. The black line represents flow at Vernalis two-and-a-half years earlier when these fish migrated out to the ocean, when they were affected by the flow in the river. And that's measured on the right y axis. This is a strong correlation over many decades. So if the</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues.</p> <p>Please also see Master Response 3.1, Fish Protection, for information regarding the need for flows from February through June, adaptive implementation, and expected benefits from a more natural flow regime.</p>

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		<p>hypothesis is that flow has an effect on escapement, this supports the hypothesis.</p> <p>When we look at other hypotheses that attempt to explain the escapement pattern, we don't see these correlations. Here, instead of flow as a black line, I've plotted the Adult Striped Bass index from the Delta, again two-and-a-half years earlier when these fish migrated to the ocean as juveniles. And we do not see a correlation between predator density in the Delta and subsequent escapement of Chinook salmon.</p> <p>Similar graphs I'll present to you in written comments show no correlation with ocean conditions or hatchery releases from the Merced or Mokelumne hatcheries.</p> <p>Several years ago, when we were presenting to you, we and California Department of Fish and Wildlife indicated that there were several seasonal average flows that correlate with population growth, 5,000 CFS as a seasonal average between March and June. Above that level seems to produce good frequency of population growth; 10,000 CFS seems to be the level that is associated with attainment of AFRP production targets.</p> <p>The point I want to make here is that flow shaping and moving flows around within this February through June period does not affect the average flow in that period. So flow shaping will not have any effect on these seasonal average correlations with the seasonal averages.</p>	<p>Also see the section in Master Response 3.1 regarding biological objectives, and for discussions of other stressors, including predation, ocean conditions, and the role of hatcheries.</p> <p>Please see Master Response 2.2, Adaptive Implementation, for further discussion of adaptive implementation of the flow proposal.</p>
622	26	<p>5,000 CFS seems to be associated with population growth. And the recurrence level that we targeted for population growth, which is not every year, results in a desired recurrence frequency that occurs when you're between 50 to 60 percent of unimpaired flow. So I'm not showing you that analysis here. It's from our previous presentation.</p> <p>And then 10,000 CFS if you want to attain the AFRP production targets on average, then you need to attain that at least every other year. That's what the on average would mean. And the recurrence frequency that you need occurs at above 60 percent of unimpaired flow.</p> <p>MS. D'ADAMO: And on the 10,000 though, you're pulling out language from the Flow Criteria Report, that's what you're citing in the green?</p> <p>CHAIR MARCUS: No.</p> <p>DR. ROSENFELD: No. This is our analysis that it sort of -- there's an image on the right that shows you that if I plot a line going through 10,000 CFS here on the vertical axis and drag it across, it's where does it intersect those lines. And you need it to occur at 50 percent of the time, all right? So it's the intersection of those two lines. And that's at above the 60 percent unimpaired flow level.</p> <p>Of course that's the configuration of the ecosystem now. That doesn't account for restoration of habitat that you might do, but the evidence that you have now is that you need flows above the 50 percent level to accomplish the legal standard and population growth to get you there.</p> <p>But we can dive now more into the specifics, because these correlations right, I mean there's two-and-a-half years between when you measure the flow and when you subsequently measure the escapement back. And so it's sort of amazing that you see the correlation at all. We can begin to unpack that correlation by looking at the relationship</p>	<p>Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p> <p>Please also see Master Response 3.1, Protection of Fish and Wildlife for further information regarding salmon doubling.</p>

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		<p>between flow on the tributaries and juveniles coming out of the tributaries.</p> <p>So on this graph we're looking at flows and survival from eggs to the juvenile life stage, from the Stanislaus River, from 1996 through 2012. And obviously there's a relationship between the amount of flow and subsequent survival throughput of juveniles from the number of eggs that you have.</p> <p>I would not draw a straight line through that relationship. It's not a linear relationship. But clearly we can see that below a certain level, flows are persistently miserable. I'm sorry -- survival is persistently miserable at low flows. And these are levels of survival from eggs to juveniles on the tributaries that are associated with severe population decline. That is a recurring phenomenon on the Stanislaus. Above that level of --</p> <p>CHAIR MARCUS: Are they persistently miserable?</p> <p>DR. ROSENFELD: Yep.</p> <p>CHAIR MARCUS: There you go.</p> <p>DR. ROSENFELD: You can quote me on that.</p> <p>CHAIR MARCUS: I will. In all kinds of contexts, not just this one.</p> <p>DR. ROSENFELD: Right. It's a good term. It's a good term for our times.</p> <p>I mean just a point to emphasize there, the population on the Stanislaus, the natural production on the Stanislaus, is a declining function going to zero very quickly. Okay? So that's why marginal improvements don't really do much. They make the population go extinct less quickly.</p> <p>At higher flow levels that are indicated here, to the right of that vertical line, you get survivals that are much better, all right? And sometimes very good levels of survival. The flow indicated by the vertical line is 438,000 acre-feet between February and June. That's about 53 percent of the median flow on the Stanislaus River.</p>	
622	27	<p>To set a flow standard of 53 percent, in the current context, you would expect to see a population growth greater than about 2.5 percent in half the years. And always lower than 2.5 percent, about 1.1 percent in half of years, okay? So that's the evidence that we have now from the system.</p> <p>It's not just -- I'll make this point quickly, because I know it'll be covered by Drs. Sturrock and Johnson later. It's not just the volume of flow, it's the flow variance. So the variability in flow seems to be associated with success of juveniles orienting and migrating out of the system. With flow shaping, the more aggressively you do that the less variance you'll get in the flow. Like that's sort of what it means to shape the flow. So you have to be very careful about how much you try and target specific outcomes with flow and moving water around. But you don't eliminate the natural signals these fish capitalize on.</p> <p>Another result that emanates from Dr. Sturrock's work on the Stanislaus is this result that was very powerful for us in the Stanislaus SEP process. In nature, you would expect that the more adults you have at reproduction time, the more juveniles you're going to get. But what these results show, again from the Stanislaus, is that under low-flow years, under drier</p>	<p>Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p> <p>Please also see Master Response 3.1, Protection of Fish and Wildlife, for further information regarding the justification and description of the plan amendments for protecting fish.</p>

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		<p>years, the red line there, that low curve, shows that the number of juveniles that you get migrating out of the system is almost unresponsive to the number of adults you get back. Whereas in wetter years, you get the relationship you expect. More spawners, more juveniles, right. So this is evidence of a very strong flow-mediated carrying capacity limit on the Stanislaus. And frankly I wouldn't be surprised to see this on all of the tributaries.</p>	
622	28	<p>I want to unpack then why you might have that carrying capacity, that flow-mediated carrying capacity limit, getting into the mechanisms of how does flow control Chinook salmon success.</p> <p>The first thing to drop in everybody's ear though is that carrying capacity is a function of habitat suitability, how good is the habitat? Over space how many acres is that habitat good for? Through time, how many months or weeks can I have adequate juvenile rearing and outmigration conditions? How many weeks or months do I have good incubation habitat? So again, you have to keep the space and time in mind while you're looking at habitat suitability.</p> <p>So getting to Board Member D'Adamo's questions about limited inundated off-channel habitat, we were able to use the Department of Water Resources Central Valley Flood Protection Plan Conservation Strategy, estimated the amount of acres needed on each of the tributaries and the Lower San Joaquin River to support a doubled population. How much room do the juveniles, from that size of a population, in order to produce that size of a population, need in order to rear successfully?</p>	<p>Please see Master Response 1.1, General Responses, for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
622	29	<p>Habitat doesn't equal wetted acre days. Wetted acre days is a metric of something, but really like muddy ground is not where fish live. They need a certain depth, certain temperature, a certain velocity and that implies a certain inundation in time.</p> <p>So the acreage in our analysis that I'm about to show you, the acreage required to support double salmon population must inundate for at least ten consecutive days. This is in the lower gradient rivers, like the main STM San Joaquin lower tributaries. Ten consecutive days is the minimum amount of time before that habitat will begin to generate its own food supply, which is the major part of the benefit that the fish are getting from the floodplain. So this is a minimum threshold.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues.</p> <p>Please also see Master Response 3.1, Fish Protection, for responses to comments raised about floodplain habitat suitability for salmonids and expected benefits of increased floodplain inundation and duration.</p>
622	30	<p>In order to support a double population, you need the habitat to support that doubled population in at least half of years, if you're going to have a doubled population on average. So we analyze here the median inundation year. Half of the years will inundate more habitat, half will inundate less habitat.</p> <p>About habitat suitability, when you go out in the field, you find out most of the habitat available is 7 to 30 percent of the 100 percent habitat suitability. Not every wet acre is perfect habitat. On average it's going to be somewhere between 7 and 30 percent. In this analysis, we assumed that the acreage that's out there is at the high end of suitability, meaning you need less acreage than you might if it was at lower suitability. So we're making a best-case scenario here for the effective flows on inundated habitat.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues.</p> <p>Please also see Master Response 3.1, Fish Protection, for responses to comments raised about floodplain habitat suitability, expected benefits of increased floodplain inundation and duration, and population doubling.</p>
622	31	<p>The fish need this habitat, this rearing habitat, all the way throughout their life cycle in fresh water. They need it upstream. They need it downstream. They need it during their migration. And the DWR Plan calculates how much acreage they need upstream and downstream. But it's not as though you can provide one flood event and flood habitat</p>	<p>Please see Master Response 1.1, General Responses, for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments. Please also see Master Response 3.1, Fish Protection, for responses to comments related to fish decline and why flow is needed. Also see Master Response 3.1 regarding floodplain inundation,</p>

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		<p>upstream and flood habitat downstream and the fish will just go the right place. They live upstream when they're upstream, inundated habitat downstream doesn't help them. When they're downstream, inundated habitat upstream doesn't help them.</p> <p>And you can use the DWR data, we have used the data, to calculate when the peak habitat need is upstream and downstream. The blue line indicates kind of how much habitat, the flows that are necessary to achieve the habitat upstream. The reddish line is the flows that are needed to achieve the habitat from the Tuolumne's contribution downstream. And the only point I want to make here is that those peaks are separated by about a month and a half, all right? So the flow that you use to produce the upstream habitat is not the same water that you're going to need later to produce the downstream habitat.</p>	<p>timing, and expected benefits, and regarding the unimpaired flow approach and seasonal flows from February through June.</p>
622	32	<p>We would look at the median year. This is 30, 40, 50, 60 percent of the median year hydrograph, shown in different colored lines on this graph. [ATT:2, ATT:13] Through time, this is -- we're now looking at the Lower San Joaquin River and these are hydrographs that are at a 7-day running average, which is what the SED calls for.</p> <p>The horizontal black line indicates the flow that's needed to inundate that maximum habitat need downstream. It's about 15,000 CFS. The width of that line is 10 days. I said it had to be inundated for 10 days in order to begin to have a positive effect. So when lines are above -- when the colored lines are above the horizontal black line the habitat is inundating. But it has to be above that black line for 10 days in order to achieve the necessary habitat inundation, using the 7-day running average. In other words, without any shaping.</p> <p>I'm now zoomed in on that zone, right? It's the same graphic above. And you can see that even the blue line doesn't inundate that habitat for 10 days, using a 7-day running average. In the table below, I show that -- well, let me say that any amount that the lines are above that black line is extra water that you have to play with. The habitat is more than inundated. It's more water than you "need" to inundate the habitat. So you could do some shaping.</p> <p>Recognize that the lower two lines don't even ever get to even one day of inundated habitat. Those represent 30 percent and 40 percent of unimpaired flow. So looking at 30 percent of unimpaired flow, the second column says you get zero days of inundation. You don't have any water available for shaping, because it's not ever above that black line. So you're acreage shortfall is 6,787 acres. Meaning if you want to support a doubled salmon population, with habitat needed in the Lower San Joaquin River, we have to find a way to create 6,787 acres. If you multiply that by about a half a million dollars per acre, you recognize the costs that are getting involved. The point here is that as flows increase, habitat that is inundated naturally increases.</p> <p>So at 60 percent of unimpaired flow you don't inundate the habitat on a 7-day running average for ten days, you inundate it for eight days, you have extra water that's above that black line, you can shape it. Your acreage shortfall at 60 percent of unimpaired flow is zero. You will inundate all the habitat you need with some modest shaping of flows.</p> <p>At 50 percent of unimpaired flow, you can shape water, you can make things better. You're still going to wind up with an acreage shortfall of 1,766 acres, which is fine. We all know we're going need to restore habitat. But I want to point out that there's a huge cost difference between 1,766 acres of acreage at 50 percent of unimpaired flow and 6,800 acres that you would need at 30 percent of unimpaired flow.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues. Please also see Master Response 3.1, Fish Protection, for responses to comments related to fish decline and why flow is needed, and regarding the unimpaired flow approach with consideration of adaptive implementation and non-flow measures. See Master Response 3.1, regarding frequency and duration of floodplain inundation. Also refer to Master Response 5.2, Incorporation of Non-flow Measures, and to Chapter 16, Evaluation of Other Indirect and Additional Actions, Section 16.3.1, Floodplain and Habitat Restoration, regarding the role of floodplain habitat restoration.</p>

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		<p>Taking this analysis upstream then to the tributaries --</p> <p>CHAIR MARCUS: Right. Just you're going to have to go fast. That's all.</p> <p>DR. ROSENFELD: Yes, I'll do my best. To Board Member D'Adamo's point, you're not going to inundate the habitat you need upstream with any of these flow requirements alone. You need to do habitat restoration. The point is that upstream it will be the same story as downstream. The more flow you provide, the more habitat will inundate and the easier it will be to locate potential restoration sites, because they are inundatable at a lower flow.</p>	
622	33	<p>The next set of analyses that I'll try and breeze through quickly are temperature analyses. These come from data in the SED [ATT:2].</p> <p>So the point that I want to make here is that not every change in temperature is an equal amount of temperature change. And in the SED the temperature analyses just show where the model says you have a greater than one degree Fahrenheit change in temperature. But if two alternatives are in the optimal zone, than that's not really a difference, as far as the fish are concerned. They're going to experience optimal conditions.</p> <p>Similarly, if the two alternatives are the detrimental lethal zone, the fish aren't going to experience a difference. And in the area in between the suboptimal zone, temperature changes make a real difference. And you can know what that difference will be in terms of the success of the fish.</p> <p>I got these standards from real places. We'll talk about them. I've mapped them out the way that you mapped out the temperature changes in the SED, showing downstream to upstream, through the months that fall-run Chinook salmon are in the river. And when we look at the Tuolumne River for instance, we can see that you gain miles of incubation habitat at 50 percent of unimpaired flow that you will not get at 40 percent of unimpaired flow. You gain both mileage of rearing habitat for juveniles that you won't get under 40 percent of unimpaired flow. And you gain an additional month of that rearing habitat being available that you won't get under 40 percent of unimpaired flow. I summarize the results here. You can read them later.</p> <p>The same thing for the Merced River. You're going to open this river to juvenile rearing and migration for an additional full month by having 50 percent unimpaired flow, versus 40 percent unimpaired flow.</p> <p>In summary, these analyses need to be integrated. [ATT:2, ATT:27] We can't just wave our hands at, "Oh, we'll create some habitat. Oh, we'll shape flow to inundate the habitat." If you're borrowing water from one time of year to create a habitat effect in another time of year, you will also create a temperature effect in both times of year: at the time that you borrowed water from, the time of year that you shift the water to. You have habitat inundation needs upstream and downstream. The less water you use, the greater the habitat acreage you'll have to create. It's very expensive. It takes a long time.</p> <p>So adding water to the system actually is a factor I think that needs to be analyzed. What is the cost of achieving the doubling objective at different levels of flow. The water costs people, consumptive users of water for sure. But using less water costs somebody billions of water to restore the necessary habitat acreage.</p>	<p>Please refer to Master Response 3.1, Fish Protection, regarding adequacy of modeling to support the analyses, and for further discussion of the use of EPA-recommended criteria in evaluating temperature-related impacts and benefits of the proposed LSJR alternatives on anadromous salmonids. As discussed in Chapter 7, Aquatic Biological Resources, Section 7.4.3, Impact AQUA-4, a change in average 7DADM water temperature of 1°F or more was used in combination with a change of 10 percent or more in the frequency of water temperatures exceeding the USEPA criteria to evaluate the potential exposure of Chinook and steelhead populations to suboptimal water temperatures.</p> <p>Chapter 19, Analyses of Benefits to Native Fish Populations from Increased Flow between February 1 and June 30, Section 19.2, Temperature, also discusses the methodology, results, and conclusion of the temperature evaluation. This includes analyses presenting percentage of time temperature criteria are met, changes in average 7DADM temperature, and changes in 90th percentile 7DADM temperature for each month under modeled baseline conditions and unimpaired flows of 30 percent, 40 percent, and 50 percent in the Stanislaus, Tuolumne, Merced, and Lower San Joaquin Rivers during 1970 to 2003 (Tables 19-3, 19-14). Refer to Master Response 2.2, Adaptive Implementation, for a detailed discussion of adaptive implementation and how it could be implemented under the plan amendments to achieve benefits to fish.</p> <p>See Master Response 3.1, Fish Protection, for a discussion of the need for more variable flow regime and expected benefits of implementation of the plan amendments. Also see the Master Response 5.2, Incorporation of Non-Flow Measures, regarding the role of non-flow measures and the plan amendments, as well as non-flow measure costs as they related to the plan amendments.</p> <p>Please refer to Master Response 1.1, General Comments, regarding the requirements of CEQA and Program-level review and for response to comments supporting higher flow requirements. Please see Master Response 1.1 and Master Response 8.0, Economic Analyses Framework and Assessment Tools, regarding the consideration of economic effects associated with the implementation of the plan amendments and the framework used to evaluate economic effects related to different resources (e.g., commercial and recreational fisheries, agriculture, hydropower).</p>

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
622	34	ATT:1: Water Quality Standards for the Lower San Joaquin River & Tributaries Doug Obegi Natural Resources Defense Council November 2016	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	35	ATT:1, ATT:2: Main Points 1. The SED fails to demonstrate that it is likely to achieve the salmon doubling objective in the Plan, contrary to law.	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	36	ATT:1, ATT:3: 1995 Plan Adopted the Salmon Doubling Narrative Objective	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	37	ATT:1, ATT:4: The Program of Implementation Must Achieve Salmon Doubling	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	38	ATT:1, ATT:5: Current Standards are Failing to Achieve Salmon Doubling Objective	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	39	ATT:1, ATT:6: Figure 33. Estimated yearly natural production, and in river escapements of Tuolumne River adult fall-run Chinook salmon. 1952-1966 and 1992-2015 numbers are from CDFG Grand Tab (Apr 11, 2016). 1967-1991 Baseline Period numbers are from Mills and Fisher (CDFG, 1994).	The commenter is providing this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	40	ATT:1, ATT:7: SED Must Show it is Likely to Achieve the Salmon Doubling Objective	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	41	ATT:1, ATT:8: SWRCB's Balancing of Beneficial Uses is Limited	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	42	ATT:1, ATT:9: Balancing and Water Transfers	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	43	ATT:1, ATT:10: Program of Implementation is Substantially Flawed	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	44	ATT:1, ATT:11: Conclusion	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	45	ATT:2: Biological Effects of Flows Proposed Water Quality Standards for the Lower San Joaquin River and Tributaries Jon Rosenfield, Ph.D. November 29, 2016 The Bay Institute	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
622	46	ATT:2, ATT:1: Main Points No evidence that flows <50% UIF will achieve salmon doubling targets or ensure a functioning south Delta ecosystem.	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	47	ATT:2, ATT:2: Analyses Numerous lines of evidence demonstrate that 40% UIF is inadequate.	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	48	ATT:2, ATT:3: San Joaquin Salmon Escapement strongly correlated with winter-spring flows	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	49	ATT:2, ATT:4: San Joaquin Salmon Escapement not strongly correlated with striped bass abundance	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	50	ATT:2, ATT:5: Seasonal Flows Correlate with Escapement	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	51	ATT:2, ATT:6: Juvenile Salmon Productivity (Survival) strongly correlated with winter-spring flows	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	52	ATT:2, ATT: 7: Juvenile Salmon Productivity (Survival) strongly correlated with winter-spring flows	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	53	ATT:2, ATT: 8: Juvenile Salmon Productivity (Survival) strongly correlated with winter-spring flows	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	54	ATT:2, ATT:9: Juvenile Salmon Productivity (Survival) Mechanism: flow-mediated carrying capacity	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	55	ATT:2, ATT:10: Flow and Carrying Capacity Mechanistic Relationships Carrying Capacity = Habitat Suitability * Space * Time Limited inundated off-channel habitat limits capacity for: Juvenile migration and rearing	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	56	ATT:2, ATT:11: Rearing Habitat Area Analysis of changes in inundated acreage must link to biological outcomes	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	57	ATT:2, ATT: 12: Rearing Habitat Area Analysis of changes in inundated acreage must link to biological outcomes	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	58	ATT:2, ATT:13: Flow and Habitat are Linked Trade-off between physical restoration and required in-stream flows	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	59	ATT:2, ATT:14: Flow and Habitat are Linked	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
		Lower flows require more habitat restoration & limit opportunities	
622	60	ATT:2, ATT:15: Flow and Habitat are Linked Lower flows require more habitat restoration & limit opportunities	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	61	ATT:2, ATT:16: Flow and Carrying Capacity Mechanistic Relationships	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	62	ATT:2, ATT:17: Temperature: Thresholds v. Continuous Effects Analysis of temperature changes must link to biological outcomes	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	63	ATT:2, ATT:18: Temperature: Thresholds v. Continuous Effects Analysis of temperature changes must link to biological outcomes	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	64	ATT:2, ATT:19: Temperature: Thresholds v. Continuous Effects Analysis of temperature changes must link to biological outcomes	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	65	ATT:2, ATT:20: Temperature: Life Stage-specific Temperature Thresholds	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	66	ATT:2, ATT:21: Tuolumne River Temperature = Modeled Temperature (SED 2016) minus Optimal Temperature (SEP 2016)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	67	ATT:2, ATT:22: Tuolumne River Temperature Gain miles of incubation habitat in Feb & March at 50% UIF	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	68	ATT:2, ATT:23: Tuolumne River Temperature Substantially better rearing conditions over miles of habitat during April at 50% UIF	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	69	ATT:2, ATT:24: Tuolumne River Temperature Successful juvenile rearing/migration extended for a month at 50% UIF	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	70	ATT:2, ATT:25: Tuolumne River Temperature	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	71	ATT:2, ATT:26: Merced River Temperature	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	72	ATT:2, ATT:27: Analysis of Habitat Effects Must be Integrated Aggressive "Flow Shaping" Will Produce Temperature Impacts; Likely Harmful at <50% UIF	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	73	ATT:3: Recommendations for Refinement through the Application of Science Based Objectives	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
		Rene Henery, Ph.D. Trout Unlimited	
622	74	ATT:3, ATT:1: Key Points In order to achieve fish population recovery (CVPIA), proposed flows must support the conditions required by fish populations	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	75	ATT:3, ATT:2: Proposed flows should support conditions required by fish populations	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	76	ATT:3, ATT:3: Proposed flows should be evaluated against science-based objectives	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	77	ATT:3, ATT:4: Additionally. . . Objectives serve as a framework to link actions from multiple contexts (e.g. SWRCB, FERC, CVFPP, CVPIA, NMFS) towards a common result (e.g. Salmon recovery)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	78	ATT:3, ATT:5: Quantitative objectives have already been developed	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	79	ATT:3, ATT:6: Existing objectives should be applied to ensure prescriptions are sufficient	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	80	ATT:3, ATT:7: What the Process should look like Objectives: to quantify what is needed Flow Prescription Development: to achieve objectives/make up for deficit (quantitatively) Flow analysis against objectives: to quantify performance relative to need and deficit/surplus Flow refinement and non-flow measure development: to achieve objectives make up for deficit (quantitatively) Implementation: of flow and non-flow measures with the expectation (hypothesis) of progress towards objectives Monitoring: to track progress against the objectives using objective based metrics Adaptive Management: to implement additional actions a) when habitat objectives not being met or b) when biological response is not occurring	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
622	81	ATT:3, ATT:8: Specific Requests/Recommendations	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
623	1	I am part of the Merced County. The State Water Board's Bay-Delta Water Plan will negatively affect me and my family, because my dad is a truck driver who transports the produce, including chickens, from the farm to the grocery stores. Without water you cannot	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
		<p>produce the crops to feed the chickens, let alone be able to raise them. This will put my father out of a job, which would affect our income drastically.</p>	
624	1	<p>I think that the panels we've heard today made what was, at least to me, a very convincing case that for environmental restoration of the rivers and the Bay-Delta that we really need significant higher flows and probably 60 percent is the number that you folks have found before. On the other hand, we heard from a lot of folks in the ag sector who say that they need more water and they want to divert more and not less water. And those certainly are important needs too.</p> <p>And I understand that your charge is to balance these things as two co-equal goals. Balance the needs of the environment against the human needs for water diversions. And one might think, okay well it should be 50-50, 50 percent of the river should stay in the river. But I would like to argue that there are human needs, which are best satisfied by water staying in the river.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
624	2	<p>A lot of people in California make their living off of those industries. [Recreation and tourism] And people come to California not to see the dry San Joaquin Riverbed down below Friant Dam, they come to see the beautiful rivers and the environments that they support.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
624	3	<p>Then there are people like me who live in the San Francisco Bay Area where the health of that beautiful Bay that we live on is very much dependent on fresh water flows coming into that. And that's of value. So I want to argue that in balancing human needs and environmental needs, it really should be a little bit more than 50 percent that stays in the river.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
625	1	<p>There's going to be a lot more droughts in the future and there's also going to be reductions in river flows caused by agencies for good decisions that they've made. So, we've got to figure out a way to replace that water, all right?</p> <p>So there's two shortages in California. Number one is the water and number two is energy. 90 percent of all the natural gas in the homes in this state is imported from Alaska and Canada and also Rocky Mountain states, so you've only got 10 percent of your natural gas is local that you're using.</p> <p>I've got a new process that's going to help both of these shortages. It's called the dissolved gas production. You get down below about 5,000 feet in the San Joaquin Valley and the water is all saline. It's not usable. It's not owned by anybody. It's just new water if we could get it. But in that water, there is approximately 1 to 2 percent of all the volume is made up of dissolved methane. And that's only methane. There's no heavier gasses. There's no oil. So it's pretty clean stuff to burn.</p> <p>So what we can do is produce a lot of this saline water from these deep bedrock aquifers and then we can desalinate it economically, using the gas that's already there. It's not like we've got to bring the big power line to desalinate it. We can use the natural gas that's in this water. And one of the interesting things about it is you get very many of these wells and they'll make 1,000 gallons of minute. A lot of farmers know that. But these wells are so deep that they will not consolidate. They're in hard rock. So you withdraw some of the water and you're not going to have subsidence, which is a problem in much of the San Joaquin Valley.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
		<p>Now a recent publication from a guy at Stanford named Rob Jackson said that use of the saline aquifers could quadruple the amount of water available in the San Joaquin Valley.</p> <p>For example around Paris, each township's got about 17 million acre-feet of saline water in that interval from about 4,000 to 8,000 feet below ground. I'm not making that up. I looked at hundreds of old oil and gas wells that were drilled out there, so we know that that water is sitting there.</p> <p>Okay, so what are you going to do? You're going to pump this water to the surface and you're going to separate the gas out. In fact, the gas will just virtually jump out. It's very simple. And the recharge from the Diablo Range to the west is going to replace all that water. There's about 320,000 acre-feet of recharge in the Diablo Range every year. And that's about how much we could produce in the western San Joaquin Valley, just to take care of this water shortage. And there'd be nothing better than to use that water to allow the farmers to keep working and to allow the fish to keep swimming.</p>	
626	1	<p>I would like to grow up and be a fifth generation farmer. However, I am worried that it will not be possible.</p> <p>The mission statement of the State Water Board is as follows, "To preserve, enhance and restore the quality of California water resources and drinking water for the protection of the environment, public health, and all beneficial uses. And to ensure proper water resource allocation and efficient use for the benefit of the present and future generations."</p> <p>After reading the proposed amendment to the Water Quality Control Plan for the San Francisco Bay-Sacramento/San Joaquin Delta Estuary and Supporting Draft Revised SED, I must beg the question- does this amendment align with the mission statement recorded above? I'm compelled to argue that it does not.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
626	2	<p>I believe that addressing the ecological crisis in the Bay-Delta is a permanent, essential and time-sensitive issue that we must resolve. However the solution must be efficient and prosperous for all beneficiaries. The proposed amendment to the SED is not a compromise. It will not have a neutral effect and it is not an efficient use of resources. And it will not be to the benefit of the present or future generations. Instead, it will be an intentional decimation to the prosperity of the Central Valley's economy.</p> <p>How will present and future generations benefit from thousands of lost jobs, billions in economic output loss, and hundreds of millions of lost farm revenue and labor income? Water is not just a resource in the Central Valley, it is our livelihood. In a region that was built on, and still relies on agriculture as its primary revenue source, this amendment will devastate our economy and our way of life.</p> <p>In agriculture, less water directly means less productivity. Can you imagine if your pay was deducted by 14 percent or more every year? This is not maximizing the benefits of this resource. It is not protecting the public trust and it is certainly not serving the public interest.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>
626	3	<p>I urge the State Water Board, our elected officials, and our communities to come together to alternatively resolve our environmental concerns, while protecting the interest of all the Bay-Delta beneficiaries. Approving this amendment to this amendment to the SED</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.</p>

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
		is not the right action for California.	
627	1	The State Water Board's Bay-Delta Water Plan will negatively affect me and my family, because my mom could lose her job in the animal industry. Because without water we cannot grow the crops needed to make and prepare the feed mix to sell to dairymen, because they could possibly go out of business.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
628	1	If you will remember at the beginning of this year we sent to you a petition with about 5,000 signatures, asking for these hearings in the beginning of the Water Quality Plan Update. And so our first words today are thank you. We are thrilled that the process has finally started.	Please see Master Response 1.1, General Comments, for information regarding the public review of the 2012 SED and 2016 Recirculated SED and the public participation process in general.
628	2	In phase one of the recirculated draft, SED, we found that there is no consideration given to the environmental justice communities of the Delta in Chapters 5 and 9. That's the hydrology chapter and the water quality and groundwater chapter. In fact, we found no real analysis in terms of impacts from the proposals on drinking water and domestic use of water for the environmental justice communities of the Delta.	<p>The concerns of disadvantaged communities (DACs) and environmental justice issues are important to the State Water Board Resources Control Board (State Water Board). But because the SED is a program-level document, the State Water Board was not required to model or assess impacts on DACs differently from the rest of the plan area and did not have unique assumptions in regard to DACs. For further discussion regarding the requirements of CEQA as they pertain to a program-level analysis, please see Master Response 1.1, General Comments. The plan amendments in no way discriminate against people on the basis of race, culture, or income. As acknowledged in Chapter 22, Integrated Discussion of Potential Municipal Water Supply Management Options, the effects of reduced surface water supplies are not felt by communities equally, with “communities of color and low-income people living in tribal, rural, and farming communities often disproportionately [experiencing] impacts on drinking water.”</p> <p>Consideration of DACs is discussed in Chapter 22, Integrated Discussion of Potential Municipal Water Supply Management Option. As described in Chapters 13, Service Providers and Chapter 22, and further articulated in Master Response 2.7, Disadvantaged Communities, using examples and information from the recent drought and detailing funding streams and sources provided by the State Water Board, the pre-existing conditions related to water supply.</p> <p>For further discussion on consideration of DACs in the SED, human right to water as it relates to DACs, financial and technical assistance programs available to assist DACs to implement water supply projects, please see Master Response 2.7, Disadvantaged Communities.</p>
628	3	We have to ask the hard question. Why export water, explicitly recognized and implicitly benefited? Or to put it another way, is not being discouraged as being made available for export, from adding San Joaquin River flows. The San Joaquin River must reach Chipps Island, in order to restore, protect and preserve the entire estuary. So we ask what's the true efficacy of this update to San Joaquin flow standards, if unsustainable water exports from the Delta aren't going to be dealt with?	Please see Master Response 1.1, General Comments, for a discussion regarding water exports.
628	4	We do not want to see a weakening of salinity standards in the south Delta. Water quality standards have to be protected for agriculture and drinking water supplies. We found the anti-degradation analysis in Chapter 23--that Table 23.2 appears to be a little bit misleading--it produces an average annual EC change of Vernalis instead of measuring the monthly changes that we need to see. The analysis claims that the increases in EC merely represent a shift in salinity concentrations. We think that we need to see all that data. We don't just want to see just the analysis. We think the public has a right to see the data to know and understand what has happening and to be able to evaluate it for ourselves.	Please see Master Response 3.3, Southern Delta Water Quality, for discussion of the LSJR alternatives and southern Delta salinity.
628	5	We believe that water flows on the San Joaquin River have to be adequate to restore and protect fisheries and to protect the public trust values of the Bay-Delta Estuary. Restoring 40	Please see Master Response 1.1, General Comments, for responses to comments that either make a general

Table 4-1. Responses to Comments

Ltr#	Cmt#	Comment	Response
		percent of unimpaired flows will not accomplish this end.	comment regarding the plan amendments or do not raise significant environmental issues.
629	1	The Delta Plan is going to affect me and my family in a negative way, because without dairies I can't get a job in my area. The milk and cheese prices and other foods will go up, because without the water they can't farm. My grandpa will lose his job on the dairy and lose his income. I believe that's how it will affect me.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
630	1	The State Water Board Bay-Delta Water will negatively affect me and my family, because it will cause a great amount of jobs to be lost including mine. Without water, we won't be able to grow crops for us and our animals. It will increase the cost of feed and people would have to give up their businesses. Our community revolves around farms and dairies. Without them, our community will be nothing.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
631	1	While boating I learned more about the importance of water quality for all of us. It isn't just about agriculture. It isn't just about fish. We drink the water. We pee in the water. We reprocess water and we put chemicals in the water, a lot of the nitrates and gold, ammine, and all those things from the mining operations.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
631	2	I don't see in your presentations, and not that you haven't covered it, is what I'll just refer to by the word hypoxia, having to do with oxygen environment. You talk about water flows, but fish and algae and all the things that are part of the ecosystem there that also make healthy clean drinking water also are affected by this. And I don't see any of that in your presentations.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
632	1	<p>Merced County has established a record of progressive actions related to water management including water well construction standards more stringent than state standards starting in the 1970s, cooperative and collaborative engagement of regional water managers in the '90s, integrated regional water management planning in the early 2000s. And most recently the adoption and implementation of a non-ministerial conditional CEQA-based Groundwater Mining and Export Permitting Ordinance effective April 2015.</p> <p>Merced County has also developed a regional surface water-groundwater interactive model to assist us in developing and implementing groundwater sustainability plans, an important component of the Sustainable Groundwater Management Act.</p> <p>Merced County has recently experienced reductions in water surface supply and has documented impacts to groundwater supplies during the recent and ongoing drought. One-hundred-and-ninety-six entities locally applied for emergency assistance due to domestic well failure. The sight of temporary water tanks in the yards of these individuals receiving trucked-in drinking water supplies for residents is staggering and it is impactful. And I think it's a vision of what could come with SED.</p> <p>The cost of domestic well replacement on average ranges from \$10 to \$25,000 per domestic well. Replacing domestic wells at \$17,500 each can have an economic impact of about \$1.75 million per 100 wells replaced or more when they're deeper. Irrigation and ag wells replacement can range from 30,000 to more than 200,000.</p> <p>It's important to note that Merced County is by definition a disadvantaged community. The disproportionate impacts to DACs due to water-supply loss, is exceptionally problematic. Impacts from the unimpaired flows proposal will likely include additional land subsidence</p>	<p>The State Water Board appreciates the efforts of Merced County to manage groundwater resources and comply with SGMA. The existing land subsidence conditions in the region are the result of legacy overdraft issues caused by unsustainable agricultural expansion; SGMA was passed by the legislature in 2014 to address overdraft issues. The State Water Board acknowledges that it will be challenging, but SGMA compliance cannot occur at the expense of reasonably protecting surface water beneficial uses; both groundwater and surface water must be protected.</p> <p>The SED and plan amendment do not require or encourage increases in groundwater pumping as a response to reductions in surface water. The SED reflects the historical response of water users to increase groundwater pumping when surface water availability is reduced. It will be up to local entities to determine the precise actions that would be taken in response to the implementation of the plan amendments. Comprehensively addressing both surface water and groundwater resources will allow for true integrated planning of California's scarce water resources and ensure adequate drinking water supplies for disadvantaged communities (DACs) in the long-term.</p> <p>For further discussion on groundwater issues, please see Master Response 3.4, Groundwater and the Sustainable Groundwater Management Act.</p> <p>For a discussion regarding the plan amendments as they relate to DACs and the resources available to assist DACs in dealing with water supply issues and improve water supply resiliency, please see Master Response 2.7, Disadvantaged Communities.</p> <p>Please see Master Response 1.2, Water Quality Control Planning Process, for information regarding the authorities and regulations governing the water quality control planning process, including the factors to be considered in establishing water quality objectives.</p>

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		and related groundwater storage losses, groundwater quality impacts and more. Merced County is experiencing historic land subsidence impacts, affecting infrastructure and diminishing flood protection on a large scale.	
632	2	<p>Reductions in surface water supply has current and likely significant and unavoidable impacts where surface water is reduced more in the future. The SED Analysis may underestimate economic water supply and quality-related impacts. The SED does not quantify groundwater quality and groundwater storage losses or land subsidence impacts although Section 13000 of the Water Code requires the State Water Board to do so.</p> <p>The SED does not integrate surface water models with readily available groundwater models. Merced County's disadvantaged communities may lack the resources needed to respond to the impacts related to unimpaired flows in the region.</p>	Please see response to Comment 632-1.
633	1	The scientific process involves defining problem statements, collecting and analyzing data, and forming and testing hypotheses. Of course, this process also involves change over time, but the recirculated draft SED incorporates best available science today. Thank you for incorporating many of the Department's recommendations. The Department will be submitting a set of formal written comments on or before the due date of January 17th, 2017.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues.
633	2	<p>At the core of the Department's interests throughout this process as the state's trustee agency for Fish and Wildlife is the undisputed fact that the Bay-Delta ecosystem is in a crisis and has undergone a regime shift. Reduction and flattening of the San Joaquin Basin tributary hydrographs over many decades has altered the physical, chemical and biological characteristics of the rivers that feed the Delta.</p> <p>These ultra-flow characteristics favor the proliferation of nonnative species that compete with native fish species. Flow alteration has also impaired ecological functions necessary to support healthy ecosystems and habitats upon which native fish populations depend.</p> <p>Poor water quality conditions, exacerbated in recent years by the drought, are driving several Bay-Delta fishes toward record-low abundance and possible extinction. We need an alternative approach and we need one now if we are to reverse this decline in fish species before it is too late.</p> <p>The Department acknowledges that there are many contributing factors to the decline that have so worried us as Fish and Wildlife trustees. We understand and recognize that estimating the precise flow needs to protect fish and wildlife beneficial uses is difficult, because of all the other complicating factors that can affect the viability of the Chinook salmon, Steelhead, and other fish and wildlife resources.</p> <p>Despite this difficulty we believe the Board has documented the scientific evidence necessary to support their recommendations. And we also believe that implementing non-flow restoration actions along with a revised flow regime provides a sound scientific approach that will go a long ways toward reversing the decline of the fish populations.</p>	Please see Master Response 1.1, General Responses, for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.
633	3	The Department supports the State Water Board's use of water quality objectives as a means to reasonably protect all beneficial uses of water. An objective can be numeric or narrative. The Department understands that several different , possible metrics may be demonstrated to preserve the shape and variability of the natural hydrograph in river	Please see Master Response 1.1, General Comments, for responses to comments in general support of the plan amendments, a specific percent of unimpaired flow, or an LSJR alternative.

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		<p>systems. It is also true that the percent of unimpaired flow (UIF) from each of the upper San Joaquin River tributaries (Stanislaus, Tuolumne , and Merced Rivers) is a means for achieving instream flow protections through preserving the shape and variability of the natural hydrograph.</p>	
633	4	<p>The water quality objectives in Table 3 of the Bay-Delta Plan for protection of fish and wildlife beneficial uses require a percent of unimpaired flow between 30% and 50% inclusive from each of the Stanislaus, Tuolumne, and Merced Rivers from February through June. The Department is often asked its views. We remind you that subsequent to the Board's staff recommendations provided in their 2012 Scientific Basis Report, in 2013, the Department provided evidence that 50%-60% of UIF (February through June) is necessary to reestablish and maintain ecosystem functions and services for fish and wildlife beneficial uses. We provided that input focused on fish and wildlife. The Department, however, acknowledges that the Board must balance all beneficial uses not just those relating to fish and wildlife.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments in general support of the plan amendments, a specific percent of unimpaired flow, or an LSJR alternative. Please see Master Response 1.1, and Master Response 1.2, Water Quality Control Planning Process, regarding consideration of beneficial uses.</p>
633	5	<p>We thank the Water Board for taking into consideration our unimpaired flow recommendations. The Water Board's responsibility to balance beneficial uses is a difficult one. We read the Recirculated Draft SED to be a balancing, because it adjusts the UIF depending on whether flow and non-flow measures are achieving the salmon protection objectives, and allows for flow shifting outside of the February through June period. This provides a flexible management strategy for fish protection that we believe is essential.</p> <p>The SED and proposed implementation plan have benefited greatly by the expanded description of the adaptive management process. The Department supports collaborative, adaptive management of a block of water within and outside the February-June period, all against the backdrop of biological goals, objectives, and effectiveness monitoring.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues. Please see Master Response 3.1, Fish Protection, for a discussion of the use of the unimpaired flow approach.</p>
633	6	<p>The Department appreciates that the State Water Board recognizes the efforts to secure collaborative voluntary agreements that would advance the restoration of flows and the improvement of physical conditions in the San Joaquin tributaries. The Recirculated Draft SED is specific about the Water Board's willingness to consider voluntary agreements. The Department knows it has a heavy responsibility ahead to forge agreements with stakeholders for presentation to the Water Board. It will not be easy. But, the use of voluntary agreements may accelerate implementation while also increasing the synergies of individual actions by, for example, coordinating both flow and non-flow actions throughout the watersheds. Acceleration of ecosystem benefits and synergies of actions are attractive outcomes for our Department, which are factors driving our interest in voluntary agreements. Thus, the Department will move ahead tirelessly with stakeholders to develop solutions to protect all beneficial uses of water within the framework identified in the SED and proposed amendments. We understand durable solutions work for people and the environment.</p>	<p>Please see Master Response 1.1, General Comments, regarding voluntary agreements. Please see Master Response 5.2, Incorporation of Non-Flow Measures regarding the recognition of the complementary nature of non-flow measures to flow requirements.</p>
633	7	<p>In closing, we believe that equally as important to identifying the San Joaquin River and tributary fish and wildlife in-river flow needs, is the need to ensure that these flows continue to support fish and wildlife as they flow into and through the Bay-Delta. We will continue to evaluate the SED, and proposed amendments, as part of Phase 1 and also continue assisting the State Water Board efforts being conducted under Phase 2.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues.</p>
634	1	<p>We are a small community, a small close-knit community unincorporated, in the north end</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general</p>

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		of Merced County. We have, like I said, a population of just a little over 5,000 people. Our main industry is agriculture and food processing. Many of our local farmers rely on irrigation water provided by TID and the Tuolumne River. Their water supply has already been reduced due to the drought. If water is reduced again, the negative impact on our local economy will be severe.	comment on the plan amendments or do not raise significant environmental issues.
634	2	We produce food for a living. Without an adequate amount of water we can't do this. This Plan will result in loss of jobs to an already economically challenged region. Merced County, as you have heard, is economically disadvantaged, with one of the highest rates of unemployment. And we can't easily pivot to another industry, given the skills of our current population.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
634	3	Groundwater has been mentioned. We already have wells that are going dry. When we rely on that water for our domestic use we cannot look to it to save the agricultural industry.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
634	4	Without access to water, we're also concerned about property values. People, if your land does not have water it's not worth anything. They won't have the ability to relocate themselves or retrain themselves.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
634	5	I'm also concerned about the loss of the food production that we produce. In the Merced, Stanislaus, San Joaquin counties, those are three of the top producing counties in the State of California and that produces a large amount of food. And under food safety, environmental and labor regulations that we are not going to get from other countries if we are importing food products.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
635	1	<p>The State Water Board's Bay-Delta Water Plan will negatively affect me and my family, because my family farms about 500 acres of almonds in the Stanislaus and Merced County. Almonds are a permanent crop, which require water every year. In 2015, we received half of our water allotment from the District and had to make up the difference with wells. If we have another year like 2015 and get no District water, we will not be able to survive with pump water alone.</p> <p>In the drought years, with the State's Water Board Plan there will not be enough water to keep our trees alive, let alone be able to produce crops. Our trees that will suffer damage that will affect us for many years. Plus this will also affect our income drastically and the value of our land.</p>	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
636	1	The State Water Board's Bay-Delta Water Plan will negatively affect me and my family, because without water we will not be able to grow crops. And if we can't grow, then we can't the feed animals. And if we can't feed the animals then dairies will go out of business. If we didn't have any dairies, my dad could possibly go out of business, because he won't have any equipment or things to repair for his customers. My dad has a farm service company. This would not only affect my father and my family, but it would also affect employees and their families.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
637	1	The State Water Board's Bay-Delta Water Plan will negatively affect my family and I. Although my mother's career involves medical billing, it will even affect her job. Because if we have to deal with unemployment, then the people of the Central Valley will look elsewhere for jobs, which will cause less need for services, just as the one that my mom provides. Unemployment will affect our entire Valley economy in a negative way.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.

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638	1	The State Water Board Bay-Delta Plan will negatively affect me and my family, because my father who is a dairyman and works for a local California Dairy, will lose his job because the dairy will go out of business without water. And if all the dairies are lost, than Hilmar Cheese, the heart and soul of Hilmar, that drives and keeps us alive, will go out of business. My grandparents also own a dairy here in Hilmar. And if we don't get water to irrigate, then we won't be able to feed our cows and can't buy feed, because feed prices are too high. Also, you took away the other farmers' water. So my grandparents' dairy will go out of business. Big feed companies will go out of business and it's a chain reaction. And all for what, to save around 1,100 fish? In my opinion it's not worth it.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
639	1	The State Water Board's Bay-Delta Plan will negative affect me and my family, because like most people who live in the country, we rely on our well for our water. If our water is going to be restricted from our reservoirs, many farmers will change to wells, like some already have. Then people who live in the country, like me will eventually run low on water, and that will cause them to drill another well, which we could not afford to do at this point. And we will really be out of groundwater.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
640	1	The State Water Board's Bay-Delta Water Plan will negatively affect me and my family economically. And cause my stepdad to maybe lose his job, because he is a manure spreader for local farmers in our area. In my household it's just me, him and my two brothers and my mom. And half the time with all the water going and prices going up slightly, it's hard for us to keep our heads above water. And with this Plan, it might cause her to even--prices to go up even more and cause even more problems.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
641	1	I'm part of the Hilmar High School FFA Department. And this Plan will really negatively have an impact on my family, because we own a family business, catering services. And that would really -- the water --this Plan would really raise prices with the crop production at low production. But it's going to negatively impact us because we won't have any produce, any local meant, any local dairy to serve to any customers for pretty much food services.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
642	1	The State Water Board's Bay-Delta Water Plan will negatively affect my family and I, because coming from a family of immigrants we depend a lot on agriculture-based jobs, many of which require the use of water. Being in a drought that California currently is in, it's already hard enough to use water. Now without the water that would be taken away from us, it will practically dry out all of our ag-related businesses such as farming, orchards and potentially event dairies. That's about 70 percent of businesses that'll go bankrupt without enough water.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
643	1	Now, as I heard you guys mention, it's going to cost money for this water and sending it back out there whenever we have none. Well, where is that money going to come from? If the Government's going to be paying for this, where are they going to take that money from? I really respect you guys think about these fish and everything and you guys want to claim -- no disrespect, but also you've got to think about the people.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.
643	2	So I mean if you want to take that water away, we're -- fish have places to go where there's hundreds of rivers. What about the people who can't go anywhere? If we lost our water, if my dad lost his job, we have nowhere else to go. We have no more money. We have no more house. We have nothing. We're just another person on the street in Merced. We all know we have enough of those people there.	Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment on the plan amendments or do not raise significant environmental issues.

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644	1	<p>Our research has direct bearing on some of the elements of the current SED. My name is Dr. Rachel Johnson and I work for NOAA Fisheries at the Southwest Fisheries Science Center. And I also have a research lab at UC Davis, at the Center for Watershed Sciences.</p> <p>And I've been conducting research on salmon in the San Joaquin River for over a decade now. And I just wanted to compliment the staff for including some of our more recent research in the new and released SED that wasn't present in the 2012 version. And so I'd just like to acknowledge kind of the due diligence on that effort.</p>	<p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues or make a general comment regarding the plan amendments.</p>
644	2	<p>While some of NOAA Fisheries' work has been published I wanted you to be made aware of some of the work that has not been published yet. And yet, represents an eight-year time series of different hydrologic variation on the Stanislaus River and how the fish respond to this flow. How it really influences the abundance of juveniles that leave these rivers and how the flow norms in the system really influence not only the abundance, but also the resilience of the salmon population in the system.</p>	<p>Please see Master Response 3.1, Fish Protection, regarding the use of the best available science.</p> <p>Please see Master Response 1.1, General Comments, for responses to comments that either make a general comment regarding the plan amendments or do not raise significant environmental issues.</p>
644	3	<p>And I wanted to take the opportunity to share this research with you. A lot of the scientific community kind of has heard it in different conference venues. It will likely be out in print before you finalize your document, so I wanted you to be aware of the stuff that we're aware of in the system while you kind of deliberate on the issues and the tasks you have at hand.</p>	<p>Please see response to comment 644-1.</p>
644	4	<p>We actually know quite a bit about salmon in the San Joaquin as it relates to water management issues. [ATT:1, ATT:2] We know that our Central Valley salmon are incredibly diverse. [ATT:1, ATT:3] We have life stages of salmon, both adults and juveniles year around in the Central Valley. And if you've been following Mike Dettinger's work, looking at climate change and variability, you also are very aware that the Central Valley has one of the most highly variable natural precipitation regimes in the country. And so we're not shy of mega-droughts, mega-floods and these fish have evolved to deal with that environmental uncertainty.</p> <p>And one of the ways that they've dealt with this changing environmental landscape is through these juvenile outmigration strategies. And so the way that they have -- salmon have evolved mitigating this risk of this changing landscape is they send juveniles out at different times and at different sizes for a given population that spawned at a given time. So what I'm showing you here is the different size gradient of what salmon do.</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses, for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	5	<p>So salmon will spawn in a river. Some of the babies will leave as these tiny little fry, all the way to spending a full year in a river before they leave. And it's a way that salmon kind of reduce the risk that happens in space and time.</p> <p>And I wanted to share with you that our research has shown that all of these strategies are viable in the San Joaquin. I think there's this perception, based on a lot of the work that has been done on these larger size smolt and acoustic-tag studies, that these little fry -- which are the dominant fish that leave the system -- are kind of wasted. That Striped Bass eat them. They're unimportant. And our research has really highlighted that they can play a fundamentally incredibly important role in the overall abundance of fish that return to the rivers, as well as the overall resiliency in the stock abundance.</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses, for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	6	<p>So what I'm showing you here is a graph looking at the proportion of fry in the survivors. So in the adults that returned, you can see that in 2000 and 2003, which is the published work</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses, for responses to comments that do not raise significant environmental issues associated with the analysis</p>

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		<p>that's been cited in the SED, that up to 25 percent of adults that returned to the Stanislaus River left the river at less than 55 millimeters, just the smallest little guys that I show you. And they spent a lot of time rearing in the Lower San Joaquin and in the Delta.</p> <p>And so they can play a fundamentally important role in the returning salmon that we've seen in the San Joaquin. And Dr. Sturrock will go into how we kind of evaluate and are able to review all these patterns. And one of the important take-home messages about this story is that the norms that we have in this system actually influence the success, the expression of what fish do and their success of those different strategies into adulthood.</p>	<p>contained within the SED or request a modification to the plan amendments.</p>
644	7	<p>So what I'm showing you here is really two, very generalizable regrettably, graphs of flows. On this Stanislaus River where on the left you have really wet years, so you have flow and turbidity in red in 1999. And you can see there in the shaded gray area that in 1999 we had really wet flow. It was a wet year, and so the dams were releasing water just for flood control purposes, right? We don't want to flood Stockton. And in years like that we have these winter pulses. And then we have these managed spring pulses afterwards.</p> <p>And in these dry years we don't have that winter flood release. It's just not put down the river and we only have this managed spring pulse. So what might that mean? Well, it turns out that when you actually have these winter flows it cues a ton of these small fish, these fry, to leave this system. So the overall production that you have, you have nearly one-and-a-half million fish being produced in this wet year. And you have orders of magnitude less in these dry years.</p> <p>And why that's important is because what we've found in our research is that large numbers game that's being played by salmon, just the sheer number of fish produced from these rivers and just the survivorship of a few of them, can be really important biologically to the population.</p> <p>And the role of kind of the flows and that variance and that early winter pulses is also echoed in work that Steve Zeug and colleagues have produced showing that when you have cumulative discharge on the Stanislaus River, you have increased survival within that river. And that variance piece again, that kind of spiky hydrograph in variation in flow, is really important in overall survival.</p> <p>MS. D'ADAMO: What timeframe are you looking at here when you say early winter?</p> <p>DR. JOHNSON: Oh, fair enough. Yeah, January to March.</p> <p>MS. D'ADAMO: Okay.</p> <p>DR. JOHNSON: And Dr. Sturrock will show specifically kind of that calendar base movement patterns in the juveniles.</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	8	<p>It's not uncommon to have this sequacity in salmon returns. This is a very, very common pattern we see for salmon across an entire species range up into Japan, Alaska, the West Coast of North America.</p> <p>What is very different in the San Joaquin, most studies will correlate the sequacity to ocean conditions, can explain 99 percent of sequacity in salmon population dynamics. What's incredibly unique for the San Joaquin is this relationship is strongly explained by the spring flows by those juveniles when they left the river and successfully returned as adults. And</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>

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		<p>you don't see the same pattern on the Sacramento side. This is a very specific piece to the San Joaquin that it looks – it appears that if you add a little bit of water to the San Joaquin, because it's so water-starved, that the fish really respond to that increase in flow.</p> <p>I'm want to show here that this is in the example that was also articulated that this is a year where we know the ocean conditions for that adult return were incredibly poor, which closed the fishery. So we see this kind of exception to the flow rule, because it really is explained by ocean conditions in that particular year.</p>	
644	9	<p>The flow knob that we have control over really influences when fish leave the system, how many leave the system and their ultimate fate. And so I know that we're talking about blocks of water, which are incredibly important. But I want to just echo that this kind of early winter piece and that variance in flow is incredibly important.</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	10	<p>So this is a wet year, 1999. [ATT:1, ATT:11] Where you've got this shaded polygon area is the flow in the river in both plots. And the white bars are the total passage, the total number of juveniles leaving. And the red line is turbidity. And then in the bottom plot you'll see the kind of mean size at exit. And really all I'm trying to show here is that first pulse really was the fry outmigrants.</p> <p>Here's the fry kind of like peak migration period, the parr and then the smolts. And so when we compare this to our dry year, 2009, you see that basically there was no migration until approximately kind of March time when the fish are already parr and smolt sized fish. So we kind of, like, lost that strategy.</p> <p>And we see this in many of the wet and dry years. And even in occasional kind of wet years the timing of the flows are very important. So for example, 2011, we had not many fry outmigrants because the flows came late. So timing of flows is definitely important and definitely seems to cue outmigration of juveniles.</p> <p>So the big take-home message here is that a) we often see in dry years no fry are leaving the river early in the season, because there's just no flow during that time and no flow variability. And we tend to see fewer fish leaving in these dry years.</p> <p>And this is just a pattern across time, so it's looking at the proportion of fry, parr and smolts in the outmigrants over the years. And really the take home is here is we do see this variance among years. But when we imagine the spring upwelling in the ocean it is hugely variable within a year. It's not necessarily the best thing that we have this switching between a fry-dominated year and a smolt-dominated year. It would be much better if it was more kind of -- we had a representation of all of these different kind of strategies.</p> <p>But the take home message here is that we do have this kind of switching among years and we see kind of the fry versus smolts. And it tends to be that wetter years with early winter flows that you'll get the fry being produced.</p>	<p>The commenter provided an attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required. This comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	11	<p>I sort of did a very coarse analysis, just use mean flows during January to June to separate these years into wetter and drier years. I used 990 CFS as the cutoff base on the NMFS 2009 biological opinion above normal, below normal sort of minimum fish schedules flows.</p> <p>And this is just to tell you that this is the same plot that John Rosenfield showed you earlier.[WQCP1.0622, ATT:2] But I think it's very, very striking that we really do see more</p>	<p>The commenter presented unpublished data supporting the scientific basis for the proposed action. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>

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		<p>outmigrants per spawners in wetter years, which is the blue line up there. And in dry years there seems to be this strong carrying capacity within the Stanislaus River that results in just fewer numbers of fish being produced, independently of the number of spawners.</p> <p>So I was kind of worried that this plot was just being driven by just tons of fry in the three very wet years: 1998, 1999 and 2000. So I did this same plot for fry, parr, smolt outmigrants. And if it was simply that the fry were remaining in the river to grow bigger and then leave later, you'd see no difference between dry and wet years for smolts and parr. In fact, you actually should see more fish leaving in these larger categories.</p> <p>But in fact we always see fewer outmigrants for spawners, strongly implying that there's a significant mortality in these kinds of low flow years.</p>	
644	12	<p>I just wanted to also draw attention to the work that we do using otoliths [ATT:1, ATT:20] to reconstruct all of these outmigrants, who are surviving, because we know we can't put an acoustic tag in a tiny fry. But so we use otoliths to reconstruct this information. And CDFW do annual carcass surveys and give us scales, so we can reconstruct the age of these adults. And we can work out well what might a juvenile, the conditions that they experienced. They do mark-recapture to work out the number of adults and then give us otoliths to do our work.</p> <p>And we're very lucky. So these otoliths are really amazing structures. They're calcium carbonate ear stones in the inner ear of all fish and they use them for hearing and for balance. They grow incrementally, so you get an idea of the age of the fish from them and the growth rates of the fish. And they also use minerals from the water around them to grow.</p> <p>So we're very lucky in the Central Valley that we've got this latitudinal grade in strontium isotope [ATT:1, ATT:21] ratios, which basically means that we've got a chemical fingerprint, if you like, of each kind of river signature. And, you know, we've all seen rivers, but most of the main salmon producing rivers have their own unique signature. So we can identify where the fish was actually from, take away the strays, and then we can do these really cool analyses to look at well, where did they go in that juvenile period? It's almost like a flight box recorder.</p>	<p>The commenter provided an attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required. This comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	13	<p>I have to just show you the instrument that we use. It's a laser [ATT:1, ATT:22] ablation multi collector inductively coupled plasma mass spectrometer. I've practiced that a lot of times. And this is how it looks in practice. So the image is a sectioned otolith and you can see the daily rings on the otolith. [ATT:1, ATT:23] This is an otolith from an adult that spawned successfully on the Stanislaus River. And we're looking at a juvenile portion of the otolith.</p> <p>And you can see the chemical output and the graph above and the map shows you our interpretation of the data.</p> <p>So the first part of the plot is basically the yolk-sac fry is using up the yolk. And because of the fall-run fish, the yolk was made in the ocean. So it starts high, basically. But now when the fry comes out of the gravel, the value is a bang-on the Stanislaus River, kind of mean signature. So we know that fish was actually from the Stanislaus River. It wasn't a stray from another hatchery.</p> <p>And this individual did not stay in the Stanislaus River for very long. Each spot is</p>	<p>The commenter provided an attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required. This comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>

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		<p>approximately 10 to 14 days worth of growth, so it actually left at about 14 days, post emergence. And then reared in the South Delta San Joaquin River for about two months, before moving very quickly out to the ocean. And that's what we do with all of the otolith that we can get from the carcass surveys.</p> <p>And you get these outputs, like I just showed you, and we're very lucky that the otolith size correlates with the fish size. So we can identify in the otolith where the fish left the river and then reconstruct the size at which it left, so we can compare these data with rotary screw trap data. And we can see this individual left about 35 millimeters fork length and the smolt outmigrant left at about 18 millimeters fork length.</p>	
644	14	<p>When we look back at the rotary screw trap data, as I mentioned before, we have these kinds of, usually, the fry-dominated years or smolt-dominated years. [ATT:1, ATT:29] This plot shows the fork length at outmigration of juveniles captured in the rotary screw trap. And yeah it tends to be that the blue, the wetter years, have the fry-dominated years, and dry years tend to be larger fish. And but you can basically see it's very bi-modal. You get kind of both small fish or very big fish.</p> <p>But when we look at who survives, we actually see while there is some evidence that there is kind of --we see smaller fish surviving to adulthood from these wetter years and the same for the dry years, we actually see these kind of massive values around the middle portion of the graph. And so actually in near every year, or actually in every year, we have the high survival rates with these intermediate size parr.</p>	<p>The commenter provided an attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required. This comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	15	<p>If there was no sort of selection going on these two plots would look identical and they clearly don't. So we know something's going on downstream of their natal river. And a hypothesis is that the fry being selected against -- partly because they're small, but also because there's now very little rearing habitat for them down in the Delta and the San Joaquin River.</p> <p>While the smolts should be doing well because they're large, they are leaving late and temperatures are already high by the time they're leaving. And predation rates are likely higher and water quality lower. So that we think it's a time selection against the larger outmigrants. But I'd just like to point out here there was a danger that we'd sort of think oh it's all about the parr. Let's just only manage for parr. But we definitely see fry and smolts surviving in all years. And we know that spring outwelling is a variable in every year. So we don't know -- you shouldn't put all your eggs in one basket, basically. And if we can try and kind of improve survival of these tail ends it can only be a positive thing in terms of risk spreading.</p> <p>And also just pointing out that even though yearlings are thought to be very rare in this system, we do occasionally see them surviving into adulthood. So there is diversity there. I just think we need to try and help manage to promote it.</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	16	<p>Bringing it back to the flow implications, here I'm showing 1-day maximum flow in the Stanislaus River before and after New Melones went in. [ATT:1, ATT:32] And my only point here is I mean these huge flows events that we've lost is a positive thing in many ways, because they obviously had detrimental flooding impacts and that's not a good thing.</p> <p>But they did also -- there were geomorphic flows and so they also reshaped the river. So we're talking so much about flow today, but I do think it's really important that we also</p>	<p>The commenter provided an attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required. This comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>

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		<p>think about habitat restoration, because they're not ever going to occur again, these geomorphic flows. And so we kind of need to think about flow and restoration as one thing. But we definitely do see a reduced flow magnitude and variance.</p> <p>And focusing on the study period that I've been discussing, 1996 to 2014, we see consistently that the plot on the right shows you the mean flows in the Stanislaus River for January to June, looking at the observed flows versus the unimpaired flows. And they're consistently below that one-to-one line.</p> <p>And the 7-day range, which is the kind of like orange circles in that same plot just show you we're also losing a lot of our variance that is important as a flow cue for fish. [ATT:1, ATT:33]</p> <p>And then the plot on the left is basically showing you that within an individual year you're really losing that spikiness in terms of what the fish experience, that kind of red lumpy bit at the bottom. That was an extreme year, 2005, but it really just goes to show that we're losing a lot of magnitude and variance within years.</p> <p>So our kind of hypothesis for how all this comes together and affects fish is that when you have reduced flow magnitude and reduced flow variance, you lose habitat and instream carrying capacity. And there are so many factors about flow that affect carrying capacity. But together they do obviously impact on the fish and we end up with fewer fish successfully leaving the river. And this seems to be a real bottleneck.</p> <p>We also, having reduced flow magnitude and variance, also impacts these kind of flow cues. And so the redistribution of juveniles is, I think, a really important thing to reduce risk in terms of just having them all rearing in a single location. Spreading them through the system, because even though we know the Delta may not be the perfect place for fry to rear, we do see fry surviving. And we see a lot of them surviving from the Sacramento Basin. So if we can improve conditions in the south Delta, that could have a big impact on this stage.</p>	
644	17	<p>When you think about this life history diversity in terms of resiliency, because a broader window outmigration [ATT:1, ATT:34] is also going to hopefully produce a larger or more resilient population in terms of meeting optimal ocean conditions.</p> <p>It's basically the opposite if we increase flow magnitude and variance. [ATT:1, ATT:34] But I do want to point out that this should always be done with the help of habitat restoration, [ATT:1, ATT:35] because a more complex habitat does produce more fish as well, so providing floodplains is also important.</p>	<p>The commenter provided an attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required. The comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	18	<p>Our three key messages are that while contributions do vary among years, these different strategies do always survive to a certain extent. So they are all viable. We shouldn't focus on one particular strategy or time of year. These early dispersers leave in such high numbers, they could have a real benefit to the populations. But they do require some cueing of flow cues in this January to March window, which currently are usually missing in dry years. And hopefully with improved habitat and flows downstream, they can really improve their survival rate.</p> <p>And then the big take-home message is within rivers that increase flow magnitude and variability, they do improve juvenile survival resulting in more fish leaving and more returns to the river. And they also provide these important flow cues to redistribute juveniles, make</p>	<p>The commenter provided an attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required. The comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>

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		<p>a broader window outmigration period, and also provide different rearing opportunities for them to encounter further downstream.</p>	
644	19	<p>It's interesting that so many fry survive, maybe because they're so small they don't look like a tasty smolt when they go by or something. I mean do you have a theory or is it just numbers?</p> <p>DR. JOHNSON: I think it's both numbers and it's also they're leaving earlier, where the water quality in the Delta is potentially better. It's not as warm, so the predators also tend to -- their metabolic rates increase with temperature, so if they leave earlier maybe the kind of the predation impact might be lower on them.</p> <p>But it's also that you don't have occupied territory. So that life history strategy -- you send some downstream, salmon aren't in any of those territories yet, so they can possibly occupy some of the habitat that other -- that is not currently occupied. So that's kind of the concept that's behind it.</p> <p>DR. STURROCK: And I should jump in there. The actual percent survival rates are very low for fry. They're consistently the lowest, but when they do leave the river they leave in such high numbers that they can make meaningful impacts to the adult populations.</p>	<p>Comment pertains to research acknowledged in SED. Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	20	<p>MS. SPIVY-WEBER: Are you incorporating climate change into your theories, your hypotheses, and if so how?</p> <p>DR. STURROCK: Well, one of the things that seems to be consistently predicted is less snow pack and earlier, warmer rain events, which would in theory be more important for this fry strategy.</p> <p>DR. JOHNSON: Yeah, I would add to that, we're just kind of -- with climate change we know from climate projections that the most southern range for this species distribution is the San Joaquin population, right? So they're at that edge of that physiological limit. And I think as it gets warmer earlier we might see an advantage of leaving earlier. And so if we wanted to put some restoration into kind of diversifying and thinking about those tails that might be a useful way of thinking about it.</p> <p>MS. D'ADAMO: Which is consistent with what you're looking at right now in January through March.</p>	<p>Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>
644	21	<p>I have a question about otolith, am I saying that right?</p> <p>DR. JOHNSON: Yes, that's right.</p> <p>MS. D'ADAMO: Okay. What can that tell us as far as so the example that you gave, you could tell that that fish came from the Stanislaus?</p> <p>DR. STURROCK: Yes.</p> <p>MS. D'ADAMO: So it's a natural fish?</p> <p>DR. STURROCK: Yeah.</p> <p>MS. D'ADAMO: Right. And then do the numbers that you have incorporate natural only, or</p>	<p>Please see Master Response 1.1, General Responses for responses to comments that do not raise significant environmental issues associated with the analysis contained within the SED or request a modification to the plan amendments.</p>

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		<p>do they include --</p> <p>DR. STURROCK: Yes.</p> <p>MS. D'ADAMO: Okay.</p> <p>DR. STURROCK: Yeah. So we do find a lot untagged hatchery fish in the samples that we have to remove. But the number we showed today were all natural origin fish.</p> <p>MS. D'ADAMO: Do you have information on the comparison between natural and hatchery?</p> <p>DR. STURROCK: Yes. What do you mean, a comparison in terms of what they did as juveniles?</p> <p>MS. D'ADAMO: Yes.</p> <p>DR. STURROCK: Yeah. The hatchery fish tend to just bump straight out of the system, because they're usually large and ready to go basically.</p> <p>DR. JOHNSON: And we should just also make mention that the proportion of hatchery fish that spawn on the Stanislaus is incredibly high. Upwards of 60 to 80 percent based on the constant fractional marking and they're not all marked. So this technique is allowing us to kind of figure out what the wild fish really are doing and kind of decoupling it from just a bunch of hatchery fish that do tend to return to the Stanislaus.</p> <p>MS. D'ADAMO: And are you seeing that that's just the first river that they hit, maybe, on return?</p> <p>DR. JOHNSON: In terms of the strays?</p> <p>MS. D'ADAMO: Uh-huh.</p> <p>DR. JOHNSON: That's a more complicated answer. There's a whole variety of fish from a whole variety of hatcheries that show up on the Stanislaus. And there's Brett Kormos and CDF&W have some really good constant fractional marking reports that really summarize kind the magnitude of hatchery string in the system, which is pretty significant for a fall run.</p>	
644	22	<p>ATT:1: Salmon life history portfolios in a regulated river</p> <p>Rachel Johnson (NOAA, UC Davis) & Anna Sturrock (UC Davis)</p> <p>Collaborators: JK Wikert (US Fish and Wildlife Service), Tim Heyne (CA Department of Fish & Wildlife), Stephanie Carlson (UC Berkeley), Sebastian Nussle (UC Berkeley), Joe Merz (Cramer Fish Sciences, UC Santa Cruz)</p>	<p>The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.</p>
644	23	<p>ATT:1, ATT:2: What do we already know?</p> <p>1. Juvenile salmon express diverse life history strategies. Most typically leave the natal stream as early dispersing fry (Williams 2006), which we know very little about. Our data shows that all strategies are viable.</p>	<p>The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.</p>
644	24	<p>ATT:1, ATT:3: What do we already know?</p>	<p>The commenter provided this attachment for reference purposes in support of their comments. Those</p>

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		1. Juvenile salmon express diverse life history strategies. Most typically leave the natal stream as early dispersing fry (Williams 2006), which we know very little about. Our data shows that all strategies are viable.	comments are addressed in these responses to comments; therefore, no additional response is required.
644	25	ATT:1, ATT:4: What do we already know? 2. Flow magnitude and variance promote life history diversity (e.g. expression of early dispersing fry), and instream survival.	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	26	ATT:1, ATT:5: What do we already know? 2. Flow magnitude and variance promote life history diversity (e.g. expression of early dispersing fry), and instream survival.	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	27	ATT:1, ATT:6: What do we already know? 2. Flow magnitude and variance promote life history diversity (e.g. expression of early dispersing fry), and instream survival.	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	28	ATT:1, ATT:7: What do we already know? 3. Juvenile rearing flows correlate with numbers of adult returns (Sturrock et al. 2015)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	29	ATT:1, ATT:8: What do we already know? 3. Juvenile rearing flows correlate with numbers of adult returns (Sturrock et al. 2015)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	30	ATT:1, ATT:9: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	31	ATT:1, ATT:10: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	32	ATT:1, ATT:11: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	33	ATT:1, ATT:12: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	34	ATT:1, ATT:13: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	35	ATT:1, ATT:14: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	36	ATT:1, ATT:15: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	37	ATT:1, ATT:16: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

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644	38	ATT:1, ATT:17: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	39	ATT:1, ATT:18: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	40	ATT:1, ATT:19: 1. Juvenile outmigration (Jan-Jun)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	41	ATT:1, ATT:20: 2. Who survives? (Adult returns Oct-Dec 2-4 yrs later)	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	42	ATT:1, ATT:21: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	43	ATT:1, ATT:22: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	44	ATT:1, ATT:23: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	45	ATT:1, ATT:24: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	46	ATT:1, ATT:25: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	47	ATT:1, ATT:26: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	48	ATT:1, ATT:27: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	49	ATT:1, ATT:28: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	50	ATT:1, ATT:29: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	51	ATT:1, ATT:30: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	52	ATT:1, ATT:31: 2. Who survives?	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	53	ATT:1, ATT:32: Environmental considerations	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	54	ATT:1, ATT:33: Environmental considerations	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.

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644	55	ATT:1, ATT:34: Environmental considerations	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	56	ATT:1, ATT:35: Environmental considerations	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	57	<p>ATT:1, ATT:36: 3 Key Messages</p> <ol style="list-style-type: none"> 1. While contributions vary among years, all juvenile life history strategies are viable. i.e. life history diversity is key to resilience. 2. Early dispersers can survive, but require flow cues in Jan-March. Their survival would likely be improved with increased flow and habitat in the San Joaquin River & south Delta. 3. Increased flow magnitude and variability increase juvenile salmon survival (abundance) and life history diversity (resilience) 	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.
644	58	ATT:1, ATT:37: Acknowledgments	The commenter provided this attachment for reference purposes in support of their comments. Those comments are addressed in these responses to comments; therefore, no additional response is required.