



Jet Propulsion Laboratory
California Institute of Technology

September 16, 2013

Dr. Peter Goodwin, Lead Scientist
Delta Science Program
Delta Stewardship Council
980 Ninth Street, Suite 1500
Sacramento, CA 95814

Dear Dr. Goodwin:

Congratulations again to you and your team on completing the second draft of the Delta Science Plan (DSP). I found the document to have improved significantly, in structure, content and focus over the 1st Draft and see that many of the comments and suggestions that our JPL team provided for the 1st Draft were addressed in some capacity. Thank you for taking such a detailed look at them and taking them into consideration in your 2nd Draft. Rather than spell out some of the high level or major comments in this letter as we did for the 1st Draft, I've simply color coded the enclosed excel spreadsheet (that details the section, page, line/figure/box information associated with our comments as requested) in a manner that distinguishes the more substantive suggestions/comments (blue) from the more minor or editorial considerations (black).

We are happy to continue to help with this activity, both as a JPL/Caltech collaboration with the Delta Stewardship Council (DSC) as well as to foster a broader NASA and inter-agency contribution to achieving the State's goals with the Delta.

We hope these additional comments and suggestions are useful; thank you for considering them. Please let us know if there is something beyond these comments that we can provide in regards to developing the next draft.

Sincerely,

A handwritten signature in black ink, appearing to read "Duane E. Waliser".

Duane E. Waliser
Chief Scientist, Earth Science and Technology Directorate
Jet Propulsion Laboratory, MS 180-400
California Institute of Technology
4800 Oak Grove Drive, Pasadena, CA 91109
818-393-4094 (tel); 818 393-3379 (fax)
<http://hydro.jpl.nasa.gov>
duane.waliser@jpl.nasa.gov

Chapter Title	Page	Line	Box/Fig #	COMMENT
DW-JPL				
Exec Summary	1	14		Did they really say "synthetic" - or synergistic --- synthetic seems problematic in this context
Exec Summary	2	1		"A shared vision for Delta science" - the rest of his bullet is good/accurate but this suggests actual "science" in the plan but that isn't really discussed.
				There is confusing labeling within the presentation of this part of the plan. On one hand the "Strategy" includes 3 parts which includes the Science Plan and 3 other components, but then sometimes it seems in this section the larger aspect of all this is simply referred to as the Delta Plan. Meaning sometimes the Plan seems to refer to the single document that is 1/3 of the strategy and sometimes the plan seems to refer to the overall construct which includes the plan, action agenda and state of science, and sometimes the plan just seems to refer to the specific single document - the plan. Can't you again please call the "plan" the implementation plan rather than the science plan and then you can refer to the larger wholistic aspect that includes the 3 parts as "The plan". OR leave Science Plan label as is but get used to naming the overall architecture as "the Delta Science Strategy" or "Delta Strategy".
Exec Summary	2,3,4			Should this last paragraph specifically mention the state of bay delta science document?
Exec Summary	4	11		why is part of this heading italicized and another part not? I see that SBDS is italicized -
Introduction	5	27		and SAA is not - why?
				"...to achieve the Objectives of the DSP" - but the objectives aren't obviously and succinctly indicated apart from meeting the co-equal goals, as the DSP is a document of how things will work. If there are such "objectives" spelled out somewhere in the document, maybe there could be a reference to them at this point in the document. (NOTE a set of "objectives" are sort of laid out in the bottom part of box 1-2)
Introduction	5	32		

Introduction	6		1-2	To ensure that best science is used to develop the Delta Science Plan, the Delta Plan recommends that the Delta Independent Science Board review the draft Delta Science Plan. <----- this seems odd to me because there really isn't the need or evidence that "science" is used to develop the DSP. There really isn't a thread of science in the document, so this statement seems like it should be modified.
Introduction	7	30		"forum" is a bit vague and could imply many constructs in this context, it would be nice to know if this is a weekly get together, a web space, a dialogue just among a few, etc --- how is this forum implemented? It would be nice if at least the scope of the "state of knowledge" could be indicated here in terms of disciplines, geographic bounds, science vs applied science - just some language to give some bounds to the what is expected by the S of Knowledge. Would it be good to reference the SBDS in this paragraph explicitly?
Introduction	8	3		Seeing the notion of "metrics" is great!!!! Here the word "objectives" comes up again but these are as yet never really spelled out so the metrics, the number of them, what they are specifically used for in terms of a given objective or more is not spelled out
Introduction	8	30		"... in short" seems like something is missing
Introduction	9	17		This is a really nice paragraph that articulates the challenges/objectives.
Organizing Science....	10	1		Awkward sentence - tries to say too much I think.
Organizing Science....	10	27-29		Only implicit here is that a more coordinated, transparent and robust form of funding support will result in reaching goals, the DSP will be doing that but it isn't explicitly mentioned here.
Organizing Science....	10	30-35		Awkward sentence - item b)
Organizing Science....	11	8		Similar to comment above - this section is really good in terms of actions, challenges, outcomes etc but the item regarding making best use of resources, collaborating across agencies, etc and explicitly using the words "funding support", "investments", etc I think is needed - as a plan there doesn't seem to be any reason to dance around it but be more specific even break this out specifically here as an item and hit it head on. e.g. Right now funding support is disparate and across agencies, with few agencies sharing common goals in terms of investment and research, monitoring, infrastructure funding priorities. A more collective and transparent strategy needs to be developed....
Organizing Science....	11	10-17		

Organizing Science....	11-12		<p>Isn't this a place where performance measures and metrics of success should also be mentioned - e.g. setting, working towards, reporting them.</p> <p>In this capacity building objective - which is great - seems like the place to touch on the notion of something, however modest, related to education. Even if DSP doesn't want to do anything specific on this or take responsibility, there should be a way of highlighting that what is done (reports, agendas, scientists) provides the means to educate young scientists and policy makers. This challenge won't be remedied in 10 years yet many of the people forming these plans and actions will be retired in 10-15 years --- so then what? [I see some aspects of this are dealt with in section 4 - can linkage / reference be made here? to that section?]</p>
Organizing Science....	12		<p>if "resources" means funding resources - then say it explicitly, if it means more than just funding, say that explicitly.</p>
Organizing Science....	13	16	
Organizing Science....	14	28-30	<p>The performance measures discussion is great. You mention 3rd part on 28 -- very good - but this could/should be reiterated as such on line 30.</p> <p>The state of bay/delta science and performance measures discussion is great!!! A nice bridge between these two is to try and come up with a few quantitative performance metrics of the state of the Bay Delta e.g. something more quantitatively related to the co-equal goals of ecosystem/fish and water avail. This would be highly valued.</p>
Organizing Science....	14		
Organizing Science....	15	2-1	<p>NICE! ISN'T THIS a schematic of the Delta Science Plan itself (almost) - why not label / tout it as such - or do the extra that would make it as such? It isn't tremendously obvious what the bottom right box is relative to the bottom middle box.</p> <p>Nice figure. There are several uses of the word "data" in this figure. If this means "observations" please use measurements or observations, or if it includes these include it explicitly. Data can be anything, "data" can be free and useless, "measurements" if that is what is intended / needed comes with explicit requirements of funding, management, etc - it can only be of value to be explicit.</p>
Adaptive Management...	17	3-1	
Adaptive Management...	17	3-2	<p>same comment as above regarding "data"</p>

Adaptive Management...	17-20			<p>This is a great section. One suggestion for improving and integrating a bit more is that in box 3-2, 3-3 and 3-4 there is discussion of models, projections, state variables etc. These all seem like candidate considerations for quantitative state of bay delta quantities related to the "performance measures" / metrics that were discussed above. Thus this Adaptive Management section could/should have some more explicit ties to the section discussion performance measures as the same things acted on here seem like the sorts of things that performance and state measures could be made from - and vice versa --- the adaptive management cycle will want to rely on key indicators, measures etc.</p> <p>"monitoring" suggests routine, to do science and carry out research objectives will also require experimental observations, developing/testing new and/or synergistic measurement strategies, potential field campaign like activities - yet the text or diagram don't convey this necessity/likelihood.</p>
Building Infrastructure...	22	all	4-1	<p>It seems that "peer-review" would apply even more so to the "Research Projects" box given you'd like to think that at the proposal and publication stage there would be peer review, and if the above comment is taken to heart, there would be elements of peer-review in regards to measurement plans and experiments.</p>
Building Infrastructure...	22	all	fig 4-1	
Building Infrastructure...	23		box 4-1	<p>Nice, thank you.</p> <p>Is it worth highlighting something of the form of "Support for community workshops such as the"Fellows Early Career Workshop" and other meetings - while these are also useful as "forums" they also seem to help educate and build capacity</p>
Building Infrastructure...	23		inset box	<p>"..participate in this biennial process". Sounds like a formal and regular research call process - which would be good - but this is never really spelled out that is what is intended nor is the case made that this is what is needed.</p>
Building Infrastructure...	24	5		<p>It would be helpful if earlier in the document upon the first use of the word</p>
Monitoring	24	36		<p>"monitoring" this "definition" was given.</p>

		<p>It would be nice to highlight for the novice reader that "monitoring" might typically be associated with single point in-situ sensors but these are sparse, require routine maintenance but yet can provide very well calibrated information at a point. However there are emerging technologies which can serve a broad expanse such as the delta wll that include both airborne and satellite remote sensing capabilities that will offer new integrated insighed, frequent (~ daily) revisits sampling the entire area. Limited effort has been put forth in fully exploiting benefits from such resources.</p> <p>the same comment above applies here</p>
Monitoring	25	
Data Mgmt	27	
		<p>*** You miss an opportunity in pointing to the incredible assets being put into orbit that can be harnessed for interdisciplinary ecosystem research / monitoring as well as water supply monitoring - and these assets are typically paid for by national and other nations funding resources. Assets such SMAP for soil moisture and vegetation, SWOT for terrestrial water supply, MODIS for ecosystem study/monitoring, OCO-2/GOSAT for photosynthetic production, SAR radar missions for infrastructure, vegetation, etc. While these aren't all at the desired level of resolution, taken together and with models provide tremendous!! assets taht should be leveraged. The above are just a few, and they don't mention that for each there are airborne assets that do have ideal target resolutions and can more easily be synergistically flown for research and monitoring. This page mentions "new sensor technologies" but this doesn't do justice to the wealth opporutnity and information at hand.</p> <p>In the same way you break out data science as a separate item and plan to hold workshops on it, the DSP would be well served by viewing new data sources, namely remote sensing strategies, in the same fashion and taking a very hard look at how these observation resources (many of which come for free to the DSP) can be better marshalled. Looking forward it seems obvious that such capabilities can/should play a significant role.</p>
Data Mgmt	27	
Data Mgmt	25-27	

Shared Modeling	29-30		<p>This section is explicitly/apparently devoid of the knowledge / representation of the use of observations ("data") and models together to provide state (and parameter) estimation through data assimilation practices. A comprehensive evaluation of the state and variability of the Delta will require (or at least benefit substantially) from combining the heterogeneous types of observations - remote sensing & in-situ - using data assimilation.</p>
Shared Modeling	29-30		<p>In this section the word "models" is used so generically that it is a bit placid - the specific uses of models should be highlighted: these include: 1) state estimation as the whole system whenever be instrumented with observations in space and time so this is necessary to optimize the available observations and model knowledge, 2) predictions of the system - this requires models of the limited area along with models that provide boundary conditions, 3) process-models for more detailed exploration of processes under investigation. These 3 specific uses are all important and they distinguish what sort of entities and resources are needed and what the objectives are. Without such articulation, the section comes across as sounding too programmatic / ignorant of the necessities of where models play lynchpin roles, and they aren't all the same.</p> <p>This is a good section to have but seems to have run out of gas a little bit in terms of its connectivity to some of the previous sections on SBDS and Action Agenda, including the performance measures considerations.</p>
Synthesis	30-31		<p>Why is UC Davis alone in a box? What formal role sets them apart? Is this a for instance or something more formal?</p>
Peer Review	33	4-6.1	<p>Recommend not just "evaluate" but "develop, propose, carry-out and evaluate" science-based solutions</p>
Resources	37	12	<p>Maybe add something in her that says provide support for training of the next generation of scientists...</p>
Resources	37	36	
Resources	38	18	<p>I don't think I would call out the "synthesis" part as is done here. This suggests that if this is done maybe it will be almost ok but this is far from the case. There has to be coordinated funding support for observational infrastructure, data handling and management, component and integrated model development, etc and all of these or not collectively coordinated and prioritized right now across the agencies.</p>