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*EDMUND G. BROWN JR., Governor*  
*CHARLTON H. BONHAM, Director*



May 23, 2018

Joseph Yun  
Executive Officer  
California Water Commission  
P.O. Box 942836  
Sacramento, CA 94236-0001

Dear Mr. Yun:

### **RELATIVE ENVIRONMENTAL VALUE OF WATER STORAGE INVESTMENT PROGRAM PROJECTS AND DEPARTMENT FINDINGS**

Thank you for your leadership during this process. As you know, the California Department of Fish and Wildlife (Department) is tasked with the responsibility of making recommendations to the California Water Commission (Commission). I acknowledge the complexity of the process has been challenging for you, Commissioners, the reviewing agencies, and each applicant. No one has tried a competitive approach to water storage on such a scale before. The good news is that the Commission and applicants are as close as ever to adding much needed water storage capacity through a portfolio of different types of projects across a diverse geography.

This competitive approach must adhere to the controlling statute and the implementing regulations. At each step of your process, our Department has always based our recommendations on the plain instructions in the statute and the regulations. All of the current applicants, as members of a broad-based stakeholder advisory group, helped develop these regulations during a two-year dialogue. At the last Commission meeting, the Department's recommendations to the Commission on monetized ecosystem benefits to include in the public benefit ratio calculations were discussed. This package contains our next assignment under the regulations related to our calculation of relative environmental value for the ecosystem improvements of a project and preliminary findings. However, as I describe at the end of this letter, each applicant retains an important obligation to complete due diligence for their projects promptly.

Pursuant to the Water Storage Investment Program (WSIP) regulations, this letter and attachments transmit to California Water Commission (Commission) staff (1) the relative environmental value scores calculated by the California Department of Fish and Wildlife (Department) and (2) the Department's findings on the public benefits claimed by each WSIP project. The WSIP regulations require the Department to calculate a relative environmental value for ecosystem improvements, based on information supplied in each project's application. (Cal. Code Regs. tit. 23, § 6007, subd. (c).) Additionally, if the Department "finds the public benefits as described in a project's application meet all of the requirements of Water Code section 79750 *et seq.* for which the reviewing

agency is responsible, the reviewing agency shall provide to the Commission a written statement confirming the finding.” (Cal. Code Regs., tit. 23, § 6012, subd. (d).) This finding is a “preliminary assessment of public benefits based on information supplied in the application that indicates that a project’s public benefits meet the requirements of Water Code section 79750 *et seq.*” (Cal. Code Regs., tit. 23, § 6012, subd. (a).)

For each ecosystem benefit quantified, project applications were required to identify at least one applicable ecosystem priority listed in section 6007, subdivision (c), of the WSIP regulations. (Cal. Code Regs., tit. 23, § 6003, subd. (a)(1)(Q).) The Department applied the 10 relative environmental value criteria outlined in Table 2 of section 6007, subdivision (c)(1)(A)(1), to score each of the ecosystem priorities identified by the applicant. Based on information supplied in the application, the Department considered information supporting ecosystem benefits including the analytical methods, modeling results, and physical, chemical, or biological information. (Cal. Code Regs., tit. 23, § 6007, subd. (c)(1)(A)(1).) Section 6007, subdivision (c)(1)(A)(2), states the score shall be assigned by evaluating the degree of change between with- and without-project conditions, and the degree to which ecosystem improvements associated with each claimed priority would be provided by a project.

The relative environmental value scores reflect the Department’s critical and thorough evaluations of project applications and include comments to the Commission and its staff that address the many aspects of the projects as proposed. The Department’s analysis contained in this package is consistent with our analysis related to public benefits.

The Department recognizes that the projects in many cases have a long history in water management planning in California, and have additional steps in front of them that will refine the projects, reduce uncertainties, and further inform the Commission’s decisionmaking. The regulations emphasize the preliminary nature of the findings submitted to you today, and the fact that changes may occur after a reviewing agency’s findings. (Cal. Code Regs., tit. 23, § 6012(g).) Moreover, prior to the Commission encumbering funding, each successful applicant must enter into enforceable contracts for public benefits and non-public benefit cost shares, complete feasibility studies and environmental documentation, obtain all required federal, state, and local approvals, and provide extensive additional information to the Commission, as applicable, on items including labor compliance, urban water management plans, agricultural water management plans, and groundwater management plans or GSP(s). (Cal. Code Regs., tit. 23, § 6013(a)(1), (c).)

This letter and attachments represent the completion of the Department’s technical review of WSIP projects for the purpose of contributing toward the maximum conditional eligibility determination of each project that the Commission must make. The Department looks forward to continuing to work with the Commission and project

Mr. Joseph Yun, Executive Officer  
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applicants in the next phase of the WSIP.

Sincerely,



Charlton H. Bonham  
Director

Encl: CDFW Findings on WSIP Public Benefits, Relative Environmental Value  
Scores, Technical Review Comments

ec: California Department of Fish and Wildlife

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## Kern Fan Groundwater Storage Project – Relative Environmental Value Score

### Project Overview

The Irvine Ranch Water District (Applicant) is proposing the Kern Fan Groundwater Storage Project (Project). The Project would recharge and store up to 100 thousand acre-feet (TAF) of State Water Project (SWP) Article 21 water in the Kern County groundwater sub-basin. Approximately 25% of the stored water would be reserved for public benefits that would be made available for ecosystem benefits through one-for-one exchanges, resulting in Table A water held in Oroville Reservoir being reclassified as SWP system water. During dry and critically dry years, the Project proposes to provide seven pulse flows over the life of the Project from Oroville Reservoir during the month of April to benefit Chinook salmon and green sturgeon. The Project also proposes to provide 1,280 acres of temporary shallow open-water habitat for migratory birds during years in which recharge activity occurs.

### Ecosystem Priorities Identified by the Applicant

The Applicant has identified the following ecosystem priorities:

- Priority 2 – Provide flows to improve habitat conditions for in-river rearing and downstream migration of juvenile salmonids.
- Priority 12 – Enhance access to fish spawning, rearing, and holding habitat by eliminating barriers to migration.
- Priority 14 – Provide water to enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species on State and Federal wildlife refuges and on other public and private lands.

The California Code of Regulations requires the California Department of Fish and Wildlife (Department) to apply 10 Relative Environmental Value (REV) criteria to score each of the priorities that an applicant claims would be provided by a project. (Cal. Code Regs., tit. 23, § 6007, subd. (c)(1)(A)(1).) Based on the information provided in the application, the Department scored each ecosystem priority listed above to determine the ecosystem REV score shown below. To implement REV Criterion 1, the Department has developed a standard calculation to assign points based on the number of ecosystem priorities a project has claimed. For each priority claimed, the Department added 0.375% to a project's final ecosystem REV score. REV Criterion 2 through 10 were each scored on a scale of 0 to 6. Detailed scores are provided in Table 1. A summary of comments for each Priority-REV combination is provided in Kern Fan Groundwater Storage Project – Technical Review Comments.

### REV Score Summary

Total Points Possible	162
Total Points Received	59.6
Additional % for Number of Ecosystem Priorities (REV Criterion 1)	1.1%
<b>Total REV Score</b>	<b>37.9%</b>

## **Kern Fan Groundwater Storage Project – Technical Review Comments**

### **REV Criterion 1 (Number of different ecosystem priorities claimed)**

To implement Relative Environmental Value (REV) Criterion 1, the California Department of Fish and Wildlife (Department) has developed a standard calculation to assign points based on the number of ecosystem priorities a project has claimed. For each priority claimed, the Department added 0.375% to a project's final ecosystem REV score. The Department has applied the standard calculation to each of the projects.

In its application for funding under the Water Storage Investment Program, the Irvine Ranch Water District (applicant) identified three ecosystem priorities for the Kern Fan Groundwater Storage Project (Project). The calculation described above resulted in an increase of 1.1% for the Project's ecosystem REV score. The Department applied the other nine REV criteria to each priority identified by the applicant. The Department's evaluation of each priority is described below.

#### **Priority 2: Provide flows to improve habitat conditions for in-river rearing and downstream migration of juvenile salmonids**

#### **Priority 2 – REV Criterion 2 (Magnitude of ecosystem improvements) Score = 2.8**

The applicant proposes the Project would provide seven pulse flows from Oroville Reservoir over the 82-year period<sup>1</sup> analyzed under 2030 conditions. However, the Water Operations Review could only confirm the availability of water to supply five pulse flows under 2030 conditions. The Cramer Fish Sciences analysis of seven pulse flows of 18 TAF, applied as a 2,400 cfs increase in Feather River flows for 3.75 days, estimates a net increase of 1,011 (or a range between 674-1348) adult spring-run Chinook and 109 (or a range between 73-145) adult winter-run Chinook from 50 years<sup>2</sup> of proposed Project operations under 2030 conditions. Although the model data indicate an overall projected increase in adult Chinook salmon abundance, the applicant's analysis also projects Delta losses for spring-run and winter-run Chinook in some years as a result of increased Delta diversions associated with the Project. The analysis estimates the seven pulse flows, could improve survival rate of hatchery and natural origin juvenile spring-run Chinook on the Feather River by approximately 4.6% on average (or range between 3.9%-6.3%), over the life of the Project, above without-Project conditions. The supporting documentation and model analysis were sufficient to justify the magnitude of improvements to juvenile Chinook salmon survival and the resulting increase in adult abundance. Steelhead were also identified as a target species for the pulse flows, but the application states that "insufficient data are available to quantify these benefits" and did not provide an analysis of steelhead benefits.

Monitoring data from rotary screw traps and seining in the Feather River suggest that the primary juvenile outmigration period of spring-run Chinook salmon occurs from January through March and decreases sharply in April. Therefore, a relatively low number of hatchery and natural origin spring-run juvenile emigrants are likely to benefit from the pulse flows in April. Additionally, winter-run juvenile peak outmigration primarily occurs from September through January, and therefore few winter-run

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<sup>1</sup> The MBK Engineers Calsim-II analysis of Project operations used an 82-year period of historical hydrologic conditions. Based on the analysis, the seven proposed pulse flows provided by the Project occur within a 50-year time frame.

<sup>2</sup> The Cramer Fish Sciences analysis of Chinook salmon benefits from the Project used the 82-year Calsim-II analysis provided by MBK Engineers to assess the net change in adult abundance and then adjusted the results to a 50-year period.

juveniles would likely benefit from the April pulse flows. In addition, because winter-run Chinook are only present in the Sacramento River, a pulse flow from the Feather River at the scale proposed would only serve to slightly improve conditions and change river dynamics for emigrating winter-run Chinook juveniles when the pulse of water reaches the confluence of the Sacramento River. In addition, the applicant did not discuss or analyze other factors contributing to successful emigration, such as water temperature, turbidity, and salinity.

**Priority 2 – REV Criterion 3 (Spatial and temporal scale of ecosystem improvements) Score = 2.8**

The pulse flows will occur in April during dry or critically dry years. The applicant assumes the pulse flows will affect 60 river miles of the Feather River and 67 river miles of the Sacramento River. The location of the pulse flows could provide for improvements that are beneficial to hatchery and natural origin juvenile spring-run Chinook during emigration on the Feather River. However, it is uncertain whether the pulse flows will be sufficient to appreciably improve conditions in the lower Sacramento River for the benefit of winter-run and spring-run Chinook from the Sacramento River basin. It is also likely that the pulse flow effects and benefits would diminish in the Delta. The April pulse flows could benefit hatchery and natural origin juvenile spring-run Chinook, because of their overlap in timing with a portion of spring-run outmigration. However, because the winter-run peak outmigration occurs from September through January, the April pulses will likely have a lesser effect, as indicated in the model analysis. The Cramer Fish Sciences technical memo provided in the application recognizes this limitation, stating that “most winter-run Chinook smolts emigrate through Delta prior to April” and that “in April, juvenile winter-run Chinook are at ‘low’ abundance in the Sacramento River downstream of Verona.”

**Priority 2 – REV Criterion 4 (Inclusion of an adaptive management and monitoring program that includes measurable objectives, performance measures, thresholds, and triggers to achieve the ecosystem benefits) Score = 2.8**

The applicant answered the questions in the General Ecosystem Worksheet completely, addressed general uncertainties, and provided preliminary adaptive management strategies. The applicant stated that the Project would consult with The Department of Fish and Wildlife and other appropriate agencies regarding development of an adaptive management program and measurable objectives, but there is no description of a framework that would be used to develop measurable objectives, performance measures, thresholds, or triggers. The Project would rely on new information from salmon flow-survival studies and surveys to potentially adjust the timing and magnitude of spring pulse flows to benefit out-migrating salmonids. However, the application did not adequately describe operational changes that would be made to ensure the realization of anticipated benefits. There is uncertainty regarding operational decisions, funding assurances, and adaptive management and monitoring parameters.

**Priority 2 – REV Criterion 5 (Immediacy of ecosystem improvement actions and realization of benefits) Score = 3.0**

The applicant proposes the Project would provide seven pulse flows from Oroville Reservoir over the 82-year period analyzed under 2030 conditions. However, the Water Operations Review could only confirm the availability of water to supply five pulse flows under 2030 conditions. The immediacy of pulse flow occurrence is uncertain because the Project relies on the availability, storage, and accrual of Article 21 water to produce a pulse flow. However, the timeline presented for Project construction and the initiation of groundwater recharge is reasonable. The estimated annual probability of 8.5% for a pulse flow is low. However, the benefit of improved survival rate for hatchery and natural origin juvenile

Chinook salmon on the Feather River would be realized when a pulse flow does occur. The ecosystem improvements in terms of changes in adult abundance will likely be difficult to quantify, because these improvements would be measured in terms of the number of spring-run and winter-run Chinook adults returning at least three years after the pulse flow is provided. Additionally, these numbers will likely be small, so it would be difficult to determine whether any increase in adult numbers was due to the Project pulse flow, or due to other factors such as variable survival rates after ocean entry.

**Priority 2 – REV Criterion 6 (Duration of ecosystem improvements) Score = 3.0**

The applicant proposes the Project would provide seven pulse flows from Oroville Reservoir over the 82-year period analyzed under 2030 conditions, with an estimated annual probability of a pulse flow occurring of 8.5%. However, the Water Operations Review could only confirm the availability of water to supply five pulse flows under 2030 conditions. The number of pulse flows and estimated annual probability are both low. The duration of ecosystem improvements is short, and benefits would be infrequent. Given the infrequency of pulse flows, there are numerous other factors that may affect adult salmon returns, such as climate change, changes in ocean conditions, and ocean harvest. Supporting documentation and model estimates used to predict the probability of a Project pulse flow being provided is sufficient to demonstrate the duration of ecosystem benefit. The proposed duration time frames are reasonable and supported by the documentation provided.

**Priority 2 – REV Criterion 7 (Consistency with species recovery plans and strategies, initiatives, and conservation plans) Score = 3.5**

The proposed pulse flows and ecosystem improvements are generally consistent with the several goals and objectives established in the National Marine Fisheries Service (NMFS) Recovery Plan for Chinook salmon and steelhead. The application identifies consistency with the December 5, 2016 NMFS Biological Opinion for Relicensing Oroville Facilities, which describes that Feather River pulse flows could benefit juvenile salmonids. However, the Project proposes pulse flows in addition to those that could be required of the Department of Water Resources (DWR) under the Biological Opinion.

**Priority 2 – REV Criterion 8 (Location of ecosystem improvements and connectivity to areas already being protected or managed for conservation values) Score = 3.5**

The location of the ecosystem benefits in relation to the proposed pulse flows is appropriate and the pulse flows would be beneficial to hatchery and natural origin juvenile spring-run Chinook salmon in the Feather River. The degree of improvements for spring-run and winter-run Chinook salmon from the Sacramento River basin is uncertain. The applicant states the Feather and Sacramento Rivers are adjacent to “numerous habitat features managed for conservation of anadromous salmonids and other species.” The application indicates that the pulse flows could possibly complement existing or future floodplain enhancements in conjunction with flow pulse events originating from other water sources. This would create hydrologic connectivity, however the applicant did not point to supporting documentation identifying connectivity to specific habitat features managed for conservation or floodplain enhancements on the Feather and Sacramento Rivers.

**Priority 2 – REV Criterion 9 (Efficient use of water to achieve multiple ecosystem benefits) Score = 3.0**

The application indicates that the ecosystem benefits would occur when a pulse flow is released, and that the 20% Delta carriage water cost and the 3% conveyance loss can be saved by extracting recharged

groundwater from the Project site in Kern County for service delivery instead of meeting demands using water from Oroville Reservoir. The application does not provide a discussion on how reduced carriage water cost and conveyance loss contribute to multiple ecosystem benefits. The applicant proposes that the pulse flows will also provide benefits toward ecosystem priority 12, however the benefits identified for Priority 12 are not supported by the documentation provided.

**Priority 2 – REV Criterion 10 (Resilience of ecosystem improvements to the effects of changing environmental conditions, including hydrologic variability and climate change) Score = 2.3**

The application and supporting documentation provide an analysis of 2070 conditions for pulse flows and resulting benefits to Chinook. The application indicates that five pulse flows can be provided under 2070 conditions. However, the Water Operations Review could only confirm the availability of water to supply four pulse flows under 2070 conditions. There are minimal operational adjustments that can be made to ensure the proposed pulse flows occur, because the Project relies on the availability, storage, and accrual of Article 21 water to produce a pulse flow. The applicant's uncertainty analysis indicates that the Project will not be able to provide a pulse flow in a 5-year drought scenario.

**Priority 12: Enhance access to fish spawning, rearing, and holding habitat by eliminating barriers to migration**

**Priority 12 – REV Criterion 2 (Magnitude of ecosystem improvements) Score = 1.5**

The applicant states that this priority will be achieved through Project pulse flows enhancing attraction and "upstream passage of adult green sturgeon in the Feather River – particularly during low flow conditions at locations like Sunset Pumps." However, the applicant acknowledges that "information to quantify these benefits is not currently available," and does not attempt to quantify with- and without-Project conditions. The supporting documentation is incomplete, as it does not provide a quantitative analysis of the proposed ecosystem benefit. The pulse flows may be helpful to green sturgeon migration, however there would likely be a very small change in the number of green sturgeon able to pass the migration barrier at Sunset Pumps, because of the short duration of the pulse flow. Sturgeon are typically adapted to gradual flood pulses and may not respond within the 3.75 days proposed for the pulse flows. Thus, barriers to green sturgeon migration would not be fully eliminated by the Project, because the proposed flows are likely not sufficient to enhance green sturgeon passage. In addition, successful spawning is predicated on other conditions besides flow, such as water temperature and sediment conditions.

**Priority 12 – REV Criterion 3 (Spatial and temporal scale of ecosystem improvements) Score = 2.5**

The pulse flows would affect the lower 60 miles of the Feather River. Two barriers to migration are found in this reach, so the Project would affect a location where migration could be improved through enhanced flow. The Project could therefore provide marginal benefits at Sunset Pumps. However, the proposed pulse of water may not be sufficient to provide passage of green sturgeon over the Sunset Pumps barrier. The pulse flow timing and frequency does not match peak migration of green sturgeon in the Feather River. Most sturgeon take advantage of high water events in the winter from January through March for migration, and April is at the end of the sturgeon migration period. However, the few fish that remain may use the pulse flow to advance if the base flow is 1,600 cfs or higher, since the additional flow provided above these base flow conditions would be sufficient to allow migration above the barriers.



**Priority 12 – REV Criterion 4 (Inclusion of an adaptive management and monitoring program that includes measurable objectives, performance measures, thresholds, and triggers to achieve the ecosystem benefits) Score = 2.3**

The applicant answered the questions in the General Ecosystem Worksheet completely, addressed general uncertainties, and provided preliminary adaptive management strategies. The applicant stated that the Project would consult with the Department of Fish and Wildlife and other appropriate agencies regarding development of an adaptive management program and measurable objectives, but provided no description of a framework that would be used to develop measurable objectives, performance measures, thresholds, or triggers. The Project would rely on new information from monitoring programs that assess flow effects on green sturgeon passage to potentially adjust the timing and magnitude of pulse flows to benefit green sturgeon. The application did not adequately describe operational changes that would be made to ensure the realization of anticipated benefits. There is uncertainty regarding operational decisions, funding assurances, and adaptive management and monitoring parameters.

**Priority 12 – REV Criterion 5 (Immediacy of ecosystem improvement actions and realization of benefits) Score = 2.0**

The applicant proposes the Project would provide seven pulse flows from Oroville Reservoir over the 82-year period analyzed under 2030 conditions. However, the Water Operations Review could only confirm the availability of water to supply five pulse flows under 2030 conditions. The immediacy of pulse flow occurrence is uncertain because the Project relies on the availability, storage and accrual of Article 21 water to produce a pulse flow. However, the timeline presented for Project construction and the start of groundwater recharge is reasonable. The annual probability of a pulse flow after Project completion is low, because the applicant estimates an annual probability of a pulse flow occurring is 8.5%. The benefit of improved green sturgeon migration could be realized when a pulse flow occurs. However, the measureable improvements may be difficult to quantify. The application indicates that an improvement would be realized through pulse flows, but does not quantify or identify an increase in green sturgeon passage above Sunset Pumps. With the proposed duration and magnitude of pulse flows, the realization of benefits is uncertain.

**Priority 12 – REV Criterion 6 (Duration of ecosystem improvements) Score = 1.8**

The applicant proposes the Project would provide seven pulse flows from Oroville Reservoir over the 82-year period analyzed under 2030 conditions, with an estimated annual probability of a pulse flow occurring of 8.5%. However, the Water Operations Review could only confirm the availability of water to supply five pulse flows under 2030 conditions. The number of pulse flows and estimated annual probability are both low. Supporting documentation and model estimates used to predict the probability of Project pulse flows are sufficient to demonstrate the duration of ecosystem benefit. The proposed duration time frames are reasonable and supported by the documentation provided. However, the duration of each pulse flow is short, and ecosystem benefits would be infrequent.

**Priority 12 – REV Criterion 7 (Consistency with species recovery plans and strategies, initiatives, and conservation plans) Score = 1.5**

The application states that a recovery plan for the Southern Distinct Population Segment of green sturgeon is not currently available. However, the applicant stated the Project is consistent with green

sturgeon objectives in the December 5, 2016 NMFS Biological Opinion for Relicensing Oroville Facilities, which describes that Feather River pulse flows could benefit juvenile salmonids and green sturgeon. However, the Project proposes pulse flows in addition to those that could be required of DWR under to the Biological Opinion.

**Priority 12 – REV Criterion 8 (Location of ecosystem improvements and connectivity to areas already being protected or managed for conservation values) Score = 3.3**

The applicant would provide pulse flows in a location that is identified as critical habitat for green sturgeon. The pulse flows could provide benefits to green sturgeon by potentially increasing passage over two barriers in the lower Feather River. There is a possibility that sturgeon can pass through or over the barriers and access more habitat upstream with the pulse flow. However, the short duration of the pulse flow limits the benefit to the species. The applicant states the Feather and Sacramento Rivers are adjacent to “numerous habitat features managed for conservation of anadromous salmonids and other species.” The application indicates that the pulse flows could possibly complement existing or future floodplain enhancements in conjunction with flow pulse events originating from other water sources. This would create hydrologic connectivity, however the applicant did not point to supporting documentation identifying connectivity to specific habitat features managed for conservation or floodplain enhancements on the Feather and Sacramento Rivers.

**Priority 12 – REV Criterion 9 (Efficient use of water to achieve multiple ecosystem benefits) Score = 2.0**

The applicant indicates that the ecosystem benefits would occur when a pulse flow is released, and that the 20% Delta carriage water cost and the 3% conveyance loss can be saved by extracting the water from the Project for service delivery, instead of meeting demands using water from Oroville Reservoir. The application does not provide a discussion on how reduced carriage water cost and conveyance loss contribute to multiple ecosystem benefits.

**Priority 12 – REV Criterion 10 (Resilience of ecosystem improvements to the effects of changing environmental conditions, including hydrologic variability and climate change) Score = 1.3**

The application and supporting documentation provide an analysis of 2070 conditions for pulse flows and resulting benefits to Chinook salmon. The application indicates that five pulse flows can be provided under 2070 conditions. However, the Water Operations Review could only confirm the availability of water to supply four pulse flows under 2070 conditions. There are minimal operational adjustments that can be made to ensure the ecosystem benefits, because the Project relies on the availability, storage, and accrual of Article 21 water to produce a pulse flow. The applicant’s uncertainty analysis indicates that the Project will not be able to provide a pulse flow in a 5-year drought scenario. The application states that the water supply for ecosystem benefits is reduced under 2070 climate change conditions, but the effects of this water supply reduction on green sturgeon migration barriers were not quantified. In addition, the supporting documentation did not address the resiliency of proposed ecosystem benefits for green sturgeon migration. Uncertainties related to modification of existing physical barriers and temperature conditions in drought years were not addressed.

**Priority 14: Provide water to enhance seasonal wetlands, permanent wetlands, and riparian habitat for aquatic and terrestrial species on State and Federal wildlife refuges and on other public and private lands**

**Priority 14 – REV Criterion 2 (Magnitude of ecosystem improvements) Score = 1.7**

The applicant expects the Project to incidentally create up to 1,280 acres of shallow open-water habitat for migratory birds for one to three winter months during wet, above normal, or below normal water year types when recharge activity occurs. This is a small change from the without-Project conditions. The recharge basins may provide a temporary resting place for waterfowl, but will not contain standing water long enough to allow for growth and establishment of wetland vegetation and habitat for waterfowl or other wetland-dependent species.

**Priority 14 – REV Criterion 3 (Spatial and temporal scale of ecosystem improvements) Score = 1.7**

Addition of 1,280 acres of recharge ponds during the winter in the Project area could provide some benefits to avian species. However, an inundated recharge basin is not necessarily equivalent to wetland habitat. The applicant did not provide information describing components of wetland habitat, such as wetland type, management of wetland vegetation, and cover for wildlife and waterfowl. Recharge events would occur during winter months, which is an appropriate timeframe for migratory birds. However, the temporal scale would provide a small degree of benefit in comparison to without-Project conditions, because benefits would only occur during winter months of wet, above normal, or below normal years.

**Priority 14 – REV Criterion 4 (Inclusion of an adaptive management and monitoring program that includes measurable objectives, performance measures, thresholds, and triggers to achieve the ecosystem benefits) Score = 1.0**

The applicant answered the questions in the General Ecosystem Worksheet completely. However, the framework for developing an adaptive management process and monitoring parameters specific to Priority 14 was not described in detail. The habitat improvement is incidental to Project operations, and therefore the Project will not actively manage this benefit.

**Priority 14 – REV Criterion 5 (Immediacy of ecosystem improvement actions and realization of benefits) Score = 2.3**

The construction timeframe of three years and six months appears reasonable. The Project schedule provided by the applicant is sufficient to support the timeframe for Project completion. The applicant proposes that the Project can begin storing water for flow pulses by 2025, which appears to be a realistic timeframe to obtain regulatory authorizations and permits. However, there is uncertainty associated with the availability of Article 21 water, frequency of recharge events, and the resulting realization of benefits.

**Priority 14 – REV Criterion 6 (Duration of ecosystem improvements) Score = 1.3**

The application states that the Project is expected to provide 21 months of recharge over the 82-year period analyzed under 2030 conditions, and would create temporary habitat for one to three months during years with recharge activity. The recharge basins will likely not contain standing water long enough to allow for growth and establishment of wetland vegetation and habitat, but may provide a temporary resting place for waterfowl.

**Priority 14 – REV Criterion 7 (Consistency with species recovery plans and strategies, initiatives, and conservation plans) Score = 0.7**

The application refers to the Stockdale Integrated Banking Project Environmental Impact Report and Central Valley Joint Venture Implementation Plan and states that the Project will be consistent with tricolored blackbird conservation efforts described in those documents by providing habitat. However, the Project proposes incidental shallow open water habitat and does not propose to restore and manage the type of wetland habitat suitable for tricolored blackbird.

**Priority 14 – REV Criterion 8 (Location of ecosystem improvements and connectivity to areas already being protected or managed for conservation values) Score = 1.7**

The proposed recharge basins are located within the Pacific Flyway and Central Valley, which should provide marginal benefit to migratory birds. The Project is two miles away from the northern boundary of the Kern Water Bank's wetland conservation areas, and the applicant proposes that the Project has hydrologic connection to the water bank. However, the applicant did not point to any supporting documentation demonstrating the hydrologic connectivity to the Kern Water Bank.

**Priority 14 – REV Criterion 9 (Efficient use of water to achieve multiple ecosystem benefits) Score = 2.0**

The applicant proposes the Project would create multiple ecosystem benefits by providing temporary habitat during recharge activity and producing pulse flows for Chinook salmon through water exchanges. However, the applicant did not point to supporting documentation to show that the use of water will achieve a particular wetland habitat or population benefit for migratory waterfowl or other wetland-dependent species.

**Priority 14 – REV Criterion 10 (Resilience of ecosystem improvements to the effects of changing environmental conditions, including hydrologic variability and climate change) Score = 2.3**

No operational considerations were provided to ensure the resiliency of ecosystem benefits. The applicant did not demonstrate that benefits would be maintained in light of changing environmental conditions, climate change, or hydrologic variability. The referenced uncertainty analysis presents a 2070 climate modeling scenario that indicates the recharge basin benefit duration is reduced by one month over 50 years of Project operations. The Project area is small and disconnected from other preserved areas and therefore may not continue to support wildlife habitat unless surrounding land use is protected from further development. No analysis was provided regarding the resiliency of ecosystem improvements to the other changing environmental uncertainties identified by the Department in the ecosystem worksheet.

Table 1. Relative Environmental Value Scores for the Kern Fan Groundwater Storage Project												
Priority	REV2	REV3	REV4	REV5	REV6	REV7	REV8	REV9	REV10	REV1	Points Possible	Points Received
P 2	2.8	2.8	2.8	3.0	3.0	3.5	3.5	3.0	2.3	X	54	26.7
P 12	1.5	2.5	2.3	2.0	1.8	1.5	3.3	2.0	1.3	X	54	18.2
P 14	1.7	1.7	1.0	2.3	1.3	0.7	1.7	2.0	2.3	X	54	14.7
<b>TOTAL</b>										REV1 = <sup>1</sup> 1.1%	162	59.6
											<b>TOTAL REV SCORE<sup>2</sup></b>	<b>37.9%</b>

<sup>1</sup>Additional 0.375 percent applied to total REV score for each priority claimed

<sup>2</sup>Total REV Score equals total points received divided by total points possible, plus REV1 percentage addition