California Fish and Wildlife Strategic Vision Project

Science Working Group Issues Framework

Revised October 24, 2011

All items highlighted in grey have been moved to the California Fish and Wildlife Strategic Vision Blue Ribbon Citizen Commission and Stakeholder Advisory Group common themes document dated October 24, 2011; the highlighted items remain in this document to help provide a record of from where information was gathered and the context within which it was developed. For the draft interim strategic vision, staff recommends that highlighted goals be removed from this document and retained only in the common themes document. Parenthetical references to tables indicate from which table text originated in the last version released to the public, dated October 17, 2011. Underline and strikeout text in former tables represent changes (additions and deletions, respectively) since an earlier version released to the public, dated October 12, 2011.

Table 1: Science Working Group Issues Framework – Proposed New Version								
ISSUE	**PROBLEM(S)**	**GOAL(S) (preceded by Sci #)**	**OBJECTIVES**	**EXAMPLE(S) OF WAYS TO ACHIEVE GOAL [TOOLS]**	**TIE(S) TO DFG STRATEGIC INITIATIVES**	**IMPLEMEN-TATION SCALE CRITERIA**	**TIME SCALE CRITERIA**	**FINANCIAL SCALE CRITERIA**
I. The capability of the California Department of Fish and Game (DFG) to design and perform sound scientific studies, to produce sound scientific results, and to evaluate scientific studies and results produced by third parties (i.e., scientific capacity).	I. The science capacity of DFG has been substantially eroded during the past two decades owing to several factors (e.g., leadership and supervisory personnel, exodus of personnel trained in scientific disciplines, inadequate financial resources).	I. Restore and enhance the scientific capacity of DFG to assure that the process of science and information derived from best available scientific studies provide a key foundation for and adequately informs, development and implementation of policy and guides management of natural resources of California.	I.1. Identify and assess the current scientific capacity and capability of DFG. I.2. Enhance the scientific capacity of DFG.	I.1.A. Create database of current employees with procedural (e.g., permit processing and issue; coordination of issues and needs among offices and external organizations) and substantive (e.g., assess needs for directed scientific studies; develop plans for scientific studies; conduct or collaborate in directed scientific studies) scientific roles in development and implementation of department policy. (Table 2, Goal 2) I.1.B. Establish a matrix that describes the interactive hierarchical structure of California agencies and extant offices within DFG that use guidance from science in their oversight of, obligations for, and authorities for conservation and management of California's natural resources, and identify overlaps and potential gaps to allow streamlining of efficiency. (Table 2, Goal 1) I.1.C. Prioritize research needs. (Table 2, Goals 2 and 3) I.2.A. Recruit, hire, and retain personnel with expertise in designing scientific studies, conducting rigorous data collection, understanding and developing scientific models,				

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				analyzing data obtained from research and monitoring, and reporting and interpreting scientific studies generated from DFG staff and outside collaborators. (Table 2, Goal 2) I.2.B. Provide for the continuing education of technical staff (including attendance of appropriate scientific conferences). (Table 2, Goal 6) I.2.B.i. Establish basic requirements and appropriate incentives for personnel to publish in peer-reviewed scientific journals and deliver reports of similar quality. (Table 2, Goal 6) I.2.B.ii. Establish mechanisms that enhance recruitment of personnel from University of California and California State University campuses. (Table 2, Goal 6) I.2.B.iii. Encourage technical personnel to pursue advanced degrees. (Table 2, Goal 6) I.2.B.iv. Establish standards for personnel performance, review, and advancement that consider scientific contributions and application of science. (Table 2, Goal 6) I.2.C. Establish appropriate scientific program offices and entities, including I.2.C.i. An *Office of Resource and Population Assessment* (in support of scientifically rigorous modeling efforts). (Table 2, Goal 5) I.2.C.ii. A *Research Branch* (to promote scientifically rigorous				

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				studies and other data collection efforts). (Table 2, Goal 5)				
				I.2.C.iii. A *Monitoring Branch* as either stand-alone entity with direct integration with the *Research Branch* or as a sub-group of the *Research Branch*. (Table 2, Goal 5)				
				I.2.C.iv. An independent multidisciplinary *Science Advisory Panel (i.e., SAP; or a Science and Biostatistics Committee)* to provide independent scientific review and guidance on DFG planning products, management plans, monitoring designs, and focused studies (Table 2, Goal 5)				
				I.2.C.iv.a. Ensure that the SAP adopts multidisciplinary approaches that include contributions from appropriate disciplines of population biology, oceanography, ecology, economics, statistics, modeling, and social sciences. (Table 2, Goal 5)				
				I.2.C.iv.b Ensure that the review of efforts are coordinated with other federal and state review capacities. (Table 2, Goal 5)				
				I.2.D. Develop mechanisms to allow and facilitate collaborative partnerships between DFG personnel and scientists from other state and federal agencies, academic institutions, and other appropriate third party scientific organizations. (Table 2, Goal 8)				
				I.2.E. Establish methods, guidelines, and policies for collecting, analyzing, archiving, and serving data and other information generated by research, monitoring, and				

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				modeling efforts by DFG personnel. (Table 2, Goal 7)				
				I.2.E.i. Coordinate/integrate methods, guidelines, and policies with other scientific data collection and archiving efforts to the extent possible. (Table 2, Goal 7)				
				I.2.F. Enhance and re-establish partnerships with academic institutions and other credible scientific organizations and stakeholders. (Table 2, Goal 8)				
				I.2.F.i. Identify needed capacity of partners (e.g., waterfowl endowment at UCD). (Table 2, Goal 8)				
				I.2.F.ii. Collaborate with University of California and California State University systems to facilitate modification and development of University curricula to help with DFG scientific needs. (Table 2, Goal 8)				
				I.2.F.iii. Encourage and facilitate partnerships with stakeholders (e.g., consumptive and non-consumptive resource users) to effect cost-saving efficiencies in scientific data collection. (Table 2, Goal 8)				
				I.2.G. Streamline MOU and scientific collection permitting processes. (Table 2, Goal 8)				
II. Integrity and trustworthiness of scientific studies used to develop policies and to manage natural	II. The scientific credibility of resource management decisions has been eroded during the	II. Restore and enhance scientific credibility of DFG and the Fish and Game Commission	II.1. Develop a functional paradigm for conducting sound scientific studies by DFG personnel and for evaluation and use	II.1.A.integrate the scientific method into research, monitoring and management activities of DFG by rigorous design and testing of null hypotheses and incorporation of other sources of scientific information as appropriate (e.g., descriptive studies, traditional ecological knowledge, strong				

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resources	past two decades owing to loss of scientific capacity within DFG and perception and evidence that development and implementation of policy in resource management processes have not been based on sound science nor on all relevant science, or that scientific methods, results and interpretations have been manipulated to achieved desired ends.		results of scientific studies conducted by third parties to develop policy and protocols for management of natural resources of California.

II.2. Develop *Science and Biostatistics Committee Model* for DFG.

II.3. Develop *Scientific Integrity Policy* to define ethical rules of conduct for scientists, science program | inference, social science). (Table 2, Goal 10)

II.1.B.Require a procedural step of effects analysis or risk assessment in all agency determinations that rely on the use of information derived from scientific studies or use other sources of reliable knowledge (i.e., peer review). (Table 2, Goal 10)

II.1.C. Define *Best Available Science, Best Available Scientific Methods,* and standards for applying them that conform to appropriate California and Federal standards (statutory and common law). (Table 2, Goal 10)

II.2.A. Consult extant models in operation in other states and federal agencies

II.2.B Coordinate scientific determinations with other state and federal scientific bodies (i.e. PFMC SSC)

II.3.A. Consult extant models in operation in other states and federal agencies and by primary scientific societies. | | | | |

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			managers and other senior supervisors and procedures for investigating conflicts of interest and disciplining misconduct.					
			II.4. Develop *Science Quality Assurance Plan* to guide scientific efforts to produce timely, credible, objective results.	II.4.A. *Quality Assurance*: Rigorous internal and external review of study proposals. (Table 2, Goal 10) II.4.B. *Quality Control*: Rigorous administrative and peer review of completed studies. (Table 2, Goal 10)				
			II.5. Establish mechanisms to promote rigorous, thorough, independent scientific review of DFG resource management, scientific studies and reports, and monitoring programs and the methods and results of scientific studies conducted by third parties and adopted by DFG.	II.5.A. Consult mechanisms and methods used by primary scientific organizations and Federal agencies charged with promoting and advancing science.				

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Lack of trust in how DFG incorporates science in policy formulation and resource management. Public must be able to see and understand how science informs decisions. *Moved goal 1 to Common Themes Table 2: Decision-Making*	Stakeholders and staff question whether all relevant and credible scientific information has been used to inform decision-making.	1. Decisions made by managers and policy-makers are transparently informed by credible science	New draft policies and resource mgmt plans are published with all scientific information cited, and a review period is provided for public comment. Draft policies and plans are reviewed by external organizations for scientific integrity, i.e. was trustworthy science used and was it reported accurately? This could be accomplished by external review panels contracted by DFG. An independent, trusted outside expert panel peer-reviews the scientific information and their report is published along with the decision/policies. Expanded use of CEQA or analogous public impact analyses is one way to achieve transparency and review. Acknowledge differences of scientific opinion and explain how these are resolved in decisions.				
Inadequacy of scientific capacity within DFG. Credible and relevant science must be available to decision-makers in a timely manner to inform decisions. *Moved goal 2 to Common Themes Table 2: Decision-Making*	Decisions are sometimes made with inadequate scientific information because it is unavailable in a timely manner.	2. Decision-making is adequately informed by science.	Assess the current scientific capacity and capability of DFG. Identify scientific disciplines for which there is insufficient capacity in DFG either to carry out research and other scientific activities directly, or to manage contracts or cooperative agreements with other scientific providers. Target recruitment to these specialties as financial opportunities become available. Develop job classifications that are competitive and will recruit and retain scientists. Develop mechanisms to attract graduate university students to careers in DFG, and provide means for present employees to enroll in graduate programs while performing research in support of DFG as well as their degrees.				

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			To maximize in-house resources, require that all proposed scientific investigations be directly tied to an identified information need (i.e. no hobby science on government time); study plans are approved in advance of work. Seek to rebalance scientific staff to match present and anticipated needs.				
Lack of public understanding of role of science in DFG Science used in policy and management must be made understandable to the interested public, and used to enhance science education.	One source of the lack of public trust is lack of understanding of scientific findings and how they are used.	3. Science conducted and used by DFG is interpreted by education specialists to provide for public understanding and learning.	This is an opportunity for DFG to develop public appreciation for the job it does while strengthening public appreciation of science and its role in conserving and managing California's wildlife. There are a variety of inexpensive ways to share digestible information on the DFG web site. There is, of course, direct outreach to schools, interest groups, etc.				

Former Table 2: Former Revised Science Working Group Issues Framework – Proposed Edited Version of October 11, 2011 Table

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Improve the scientific capacity of DFG **(To assure that the process of science and information derived**	Lack of funding and loss of key personnel coupled with many new unfunded mandates have hampered DFG's ability to ~~meet~~ achieve	1. Integrated resource management	Establish a matrix that describes the interactive hierarchical structure of California agencies and extant offices within and outside DFG that use guidance from science in their oversight of, obligations for, and authorities for conservation and management of California's natural resources.				

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from scientific studies provide basis for and guide policy development and resource management carried out by DFG) *Moved goal 1 to Common Themes Table 4: Integrated Resource Management*	its mission.		, and identify overlaps and potential gaps to allow streamlining of efficiency.				
Moved goal 2 to Common Themes Table 5: Staff Development	DFG lacks the scientific capacity in certain areas, (e.g. modeling expertise) There is current disorganization of how science is managed within DFG Generating the science or using science generated by others is sometimes viewed with distrust (depending on source or lack of peer review or other factors)	Ensure decisions made by managers are informed by science Restore (increase?) the core capacity of DFG to produce science for areas that relate back to primary goals. 2. Core areas – retain and expand internal science capacity. 3. External/peripheral areas – use cooperative agreements or contracts	1. Assess the current scientific capacity and capability of DFG. a2. Create database of current employees with procedural (e.g., permit processing and issue; coordination of issues and needs among offices and external organizations) and substantive (e.g., assess needs for directed scientific studies; develop plans for scientific studies; conduct or collaborate in directed scientific studies) scientific roles in developing and implementing DFG policy. 23. Recruit, hire, and retain personnel with expertise in designing scientific studies, conducting rigorous data collection, understanding and developing scientific models, analyzing data obtained from research and monitoring, and reporting and interpreting scientific studies generated from DFG staff and outside collaborators. 3. Prioritize research needs 4.4. Ensure internal capacity to manage cooperative agreements. Positive example is the Condor Program.	3, 7			

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Improve scientific capacity *Moved goal 4 to Common Themes Table 2: Decision-Making* *Moved goal 5 to Common Themes Table 5: Staff Development*	~~Include an education component on modeling within the field.~~DFG lacks scientific modeling expertise ~~There is current disorganization of how science is managed within DFG~~	~~Understanding/interpreting~~ 4. Ensure understanding and accurate interpretation of ~~the~~ science 5. Establish scientific program offices	Establish appropriate scientific program offices and entities, including: 1. An *Office of Resource and Population Assessment* (in support of scientifically rigorous modeling efforts). 2. A *Research Branch* (to promote scientifically rigorous studies and other data collection efforts). 3. A *Monitoring Branch* as either stand alone entity with direct integration with the *Research Branch* or as a sub-group of the *Research Branch*. 4. An independent multidisciplinary *Science Advisory Panel (i.e., SAP; or a Science and Biostatistics Committee)* to provide independent scientific review and guidance on DFG planning products, management plans, monitoring designs, and focused studies (see 2.ii). a. Ensure that the SAP adopts multidisciplinary approaches that include contributions from appropriate disciplines of population biology, oceanography, ecology, economics, statistics, modeling, and social sciences. b. Ensure that the SPS coordinates the review of efforts with other federal and state review capacities.	3, 7			
Improve scientific capacity ~~Improve scientific capacity of DFG~~ *Moved goal 6 to Common Themes Table 5: Staff Development*	DFG is losing scientific expertise~~DFG uses science and produces science, which can cause perception problems~~	6. Improve recruitment and retention of qualified biologists ~~Clearly define the mix of scientific information gathered versus that generated. A matrix to define who does what and how it is~~	1. Become competitive with other state agencies and the private sector in pay scale. Classifications need to be on par (equity and financially) with state and federal agencies 2. Provide for the continuing education of technical staff (including attendance at appropriate scientific conferences) 3. Establish basic requirements and appropriate incentives for personnel to publish in peer-reviewed scientific journals and deliver reports of similar quality.				

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		interpreted.	4. Establish mechanisms that enhance recruitment of personnel from University of California and California State University campuses.				
			5. Encourage technical personnel to pursue advanced degrees.				
			Establish standards for personnel performance, review, and advancement that consider scientific contributions and application of science. Partner with the appropriate entities to produce science for the other goals. Facilitate (enhance/reestablish collaborative partnerships (specifically for modeling – needs to be in-house – both staff who can do the modeling as well as understand it if being done outside)				
Improve scientific capacity of DFG *Moved goal 7 to Common Themes Table 7: Defining and Supporting Success*	Databases don't talk to each other share standardized , integrated format – siloing issue within the dept Data are collected and filed away unused/shoebox problem Don't always know why data is being collected For data/ information gaps, and filling monitoring needs. partnerships should be established to determine	7. Enhance data management systems employing new technologies (i.e. GIS databases, Marine Map)For data/ information gaps, and filling monitoring needs. Partnerships should be established to determine who will gather scientific information – avoid duplication of efforts	Establish methods, guidelines, and policies for collecting, analyzing, and archiving data and other information generated by research, monitoring, and modeling efforts by DFG personnel. Coordinate/integrate methods, guidelines, and policies with other scientific data collection and archiving efforts to the extent possible.Develop mechanisms to allow and facilitate collaborative partnerships between DFG personnel and scientists from other state and federal agencies, academic institutions, and other credible scientific organizations and stakeholders. 1. Identify needed capacity of partners (e.g., waterfowl endowment at UCD). 2. Collaborate with University of California and California State University systems to facilitate modification and development of University curricula to help with DFG scientific needs. 3. Encourage and facilitate partnerships with stakeholders (e.g., consumptive and non-consumptive resource users) to effect cost-saving efficiencies in scientific data collection.				

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	who will gather scientific information – avoid duplication of efforts		Streamline MOU and scientific collection permitting processes.				
Improve scientific capacity Improve scientific capacity of DFG *Moved goal 8 to Common Themes Table 1: Partnerships*	Serious reduction in funding and staff , coupled with expanded unfunded mandates, has caused redundancies in some areas and gaps, inefficiencies in other areas Don't always know why data is being collected	8. Facilitate partnerships to expand DFG capacity	Develop mechanisms to allow and facilitate collaborative partnerships between DFG personnel and scientists from other state and federal agencies, academic institutions, and other credible scientific organizations and stakeholders. 1. Identify needed capacity of partners (e.g., waterfowl endowment at UCD). 2. Collaborate with University of California and California State University systems to facilitate modification and development of University curricula to help with DFG scientific needs. 3. Encourage and facilitate partnerships with stakeholders (e.g., consumptive and non-consumptive resource users) to effect cost-saving efficiencies in scientific data collection. Streamline MOU and scientific collection permitting processesCoordinate/integrate methods, guidelines, and policies with other scientific data collection and archiving efforts to the extent possible				
Improve scientific credibility of DFG *Moved goal 9 to Common Themes Table 2: Decision- Making*	It is important to separate science from policy, esp. in processes funded by outside sources that also fund the science used. Need to avoid practice or perception of agenda-driven science	9. Ensure separation between science and policy	Clearly identify the mix of scientific information gathered and used, and its source.. Integrate all relevant science in policy decisions to the degree possible. Develop matrix to define science used, w/ clear rationale for relevant science not used in decision-making,to ensure transparency. Partner with the appropriate entities to produce science for non-core goals. Facilitate (enhance/reestablish collaborative partnerships (specifically for modeling – needs to be in-house – both staff who can do				

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			the modeling as well as understand it if being done outside)				
Improve scientific ~~capacity~~ credibility **of DFG** *Moved goal 10 to Common Themes Table 2: Decision- Making*	Analysis does not always include peer review Public distrusts the ~~department~~decision-making process Perception that science is being manipulated Transparency of science and decision making is inadequate Science information is not applied or not available in a timely manner	10. Ensure decisions made by managers are informed by best available, peer reviewed science ~~Science that DFG produces is trustworthy (it has rigorous quality assurance/quality control), accessible (data management) and useful (science that needs to get done is done and the information gathered is used to inform decisions after being peer reviewed).(~~ ~~Science needs to be completely transparent and trustworthy.~~	~~Establish methods, guidelines, and policies for collecting, analyzing, and archiving data and other information generated by research, monitoring, and modeling efforts by DFG personnel.~~ ~~Improve transparency of how science information is used in decision making.~~ – ~~3.~~ Establish proper procedures to ensure a ~~system~~decision-making process and use of science that is transparent, trustworthy and is useful. – ~~4.~~Require Independent, external peer review of the science ~~should improve this problem.~~ ~~5. Prioritize research needs.~~ ~~6. More consistent and documented processes. Broader transparency of data.~~ – Prescribe a paradigm for conduct and use of science in developing policy and implementing resource management. a. Integrate the scientific method into research, monitoring and management activities of DFG by rigorous design and testing of null hypotheses and incorporation of other sources of scientific information as appropriate (e.g., descriptive studies, traditional ecological knowledge, strong inference, social science). – Require a procedural step of effects analysis or risk assessment in all agency determinations that rely on the use of information derived from scientific studies or use other sources of reliable knowledge. b. Define *Best Available Science* and standards for its application				

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			that conform to federal standards (statutory and common law).				
			– 2. Develop *Science and Biostatistics Committee Model* for DFG (see 1.b.ii.4)				
			– 3 Develop *Scientific Integrity Policy* to proscribe ethical rules of conduct for scientists, science program managers and other senior supervisors and procedures for investigating conflicts of interest and disciplining misconduct.				
			– 4 Develop *Science Quality Assurance Plan* to guide scientific efforts to produce timely, credible, objective results. – *Quality Assurance*: Rigorous internal and external review of study proposals. – *Quality Control*: Rigorous administrative and peer review of completed studies.				
			– 5 Establish mechanisms to promote rigorous, thorough, independent scientific review of DFG resource management, scientific studies and reports, and monitoring program. (see 1.b.ii.4)				
			– 6 Provide appropriate separation in tasking but consistent dialogue between scientific staff that design, conduct, analyze, and interpret scientific studies and resource managers, regulators, and policy-makers				
Integrate science (as defined as best available science; 2.i.3) from all relevant disciplines into policy development (includes economic and	In some cases, the science that informs decisions has not been fully integrated from all relevant disciplines.	11. DFG policy makers are fully informed by science across disciplines from all relevant sources.	– Modify decision-making processes to facilitate integration across disciplinary and administrative boundaries (i.e., balancing test for sufficient time versus efficiency; e.g. one-year status review under CES). – Ensure independence of scientific programs from political influence.				

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social as well as state versus federal) ***Moved goal 11 to Common Themes Table 2: Decision- Making***							
Moved goal 12 to Common Themes Table 2: Decision- Making	There are disagreements/ disputes among the science	12. Publicly acknowledge that there are disagreements within the science – be transparent about those choices.	– California Council on Science and Technology (equivalent of National Academies of Science) – peer review – use science consistencies (use independent scientific review) – Credible, published scientific data is produced in a scientific document. Both scientific methods are described. – Decision-making body acknowledges the differences in the science and explains the reason for why they chose the science used.				

Former Table 3: Items to Potentially Move to Other Working Group(s)

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Governance and Mission Working Group?	~~Losing good employees~~	~~Improve employee recruitment and retention~~	~~1. Become competitive with other state agencies and the private sector in pay scale. Classifications need to be on par (equity and financially) with state and federal agencies~~ ~~2. Provide for the continuing education of technical staff (including attendance at appropriate scientific conferences)~~				

			~~3. Establish basic requirements and appropriate incentives for personnel to publish in peer-reviewed scientific journals and deliver reports of similar quality.~~ ~~4. Establish mechanisms that enhance recruitment of personnel from University of California and California State University campuses.~~ ~~5. Encourage technical personnel to pursue advanced degrees.~~ ~~Establish standards for personnel performance, review, and advancement that consider scientific contributions and application of science.~~				
Governance and Mission Working Group?	There are not enough positions in certain departments to do the mandated work, including DFG.	Ensure that DFG has the staff capacity to do its mandated work.					