MAY 2015

California Water Commission
Water Storage Investment Program
Stakeholder Advisory Committee Meeting

Opening

- Welcome
- Member Introductions
- Today's Agenda

SAC Meeting Topics

- Charter
- Definitions
- Process Flow Chart
- Priorities and Relative Value
- Overview of Framework to Quantify Public Benefits
- Public Comments
- Next Steps and Action Items

Stakeholder Advisory Committee
Charter

Water Storage Investment Program
Definitions

Definitions to be Covered Today

- "state water system"
- Eligible project types
- Public benefit categories

“State Water System” Use

§79750(b)

... the sum of two billion seven hundred million dollars ($2,700,000,000) ...appropriated ...for public benefits associated with water storage projects that **improve the operation of the state water system**, are cost effective, and provide a net improvement in ecosystem and water quality conditions, in accordance with this chapter. ...

“State Water System” Draft Definition

The state water system is all of the state’s water systems collectively, including local, regional, state and federal systems that provide water resources benefits within California.

Section 79751 – Eligible Storage Projects

- Surface storage projects identified in the CALFED Bay-Delta Program Record of Decision, dated August 28, 2000, except for projects prohibited by Chapter 1.4 (commencing with Section 5093.50) of Division 5 of the Public Resources Code.
- Groundwater storage projects and groundwater contamination prevention or remediation projects that provide water storage benefits.
- Conjunctive use and reservoir reoperation projects.
- Local and regional surface storage projects that improve the operation of water systems in the state and provide public benefits.

“CALFED Projects” Draft Definition

Surface storage projects identified in the CALFED Bay-Delta Program Record of Decision, dated August 28, 2000, except for projects prohibited by Chapter 1.4 (commencing with §5093.50) of Division 5 of the Public Resources Code, which are the following:

- Los Vaqueros Reservoir Expansion
- In-Delta Storage Project
- Shasta Enlargement
- Sites Reservoir
- Temperance Flat Reservoir

To be eligible, each CALFED surface storage project must demonstrate that it is not prohibited by Public Resources Code §5093.50 et seq.

“Groundwater Storage Projects” Draft Definitions

- **Groundwater storage projects –** For the purposes of the WSIP, groundwater storage projects are those that bank water for the project sponsor and/or for external customers in an aquifer for later withdrawal by the project sponsor or external customers. Such projects shall include contractual arrangements with the external customers that detail the water supply accounting and withdrawal obligations and conditions.
- **Groundwater contamination prevention projects that provide water storage benefits –** Projects that prevent groundwater contamination by eliminating contamination sources from point sources (landfills, leaking gasoline storage tanks, leaking septic tanks and accidental spills) or non-point sources (naturally occurring contaminants such as iron, sulfates, radon, and arsenic and runoff from parking lots, pesticides and fertilizers that infiltrate the soil) or projects that prevent seawater intrusion or migration of contaminants into groundwater basins through the use of seawater or hydraulic barriers.
- **Groundwater contamination remediation projects that provide water storage benefits –** Projects that remove constituents or contaminants that have degraded water quality of the groundwater and restore the capacity of the groundwater basin storage for

"Conjunctive Use and Reservoir Reoperation Projects" Draft Definitions

- **Conjunctive use projects** – Projects that allow for the coordinated and planned management of both surface water and groundwater resources in order to maximize the efficient use of both resources. Water supplies regardless of whether the source of water is surface water, recycled water, or groundwater, are stored in the groundwater basin through intentional recharge for planned use later.

- **Reservoir reoperation projects** – Projects that involve the modification of the operations of existing surface storage reservoirs to improve operational efficiencies or respond to changing conditions. Reoperation projects may involve modification of flood operations to allow encroachment into the flood reservation space using improved flood forecast information such as forecast-based operations. Reoperation projects may include construction of appurtenant infrastructures such as spillways, radial gates, tunnels, conveyance facilities, etc. Reoperation projects must result in long-term operational changes that support public benefits and operational changes must be documented in a facility's operations document (e.g., a Water Control Manual for a reservoir).

“Local and Regional Surface Storage Projects” Draft Definition

Local and regional surface storage projects that improve the operation of water systems in the state and provide public benefits. Local and regional surface storage projects provide water deliveries within a more limited geographic area when compared to the CALFED ROD surface storage projects or other components of the SWP or CVP. Such projects primarily address increasing local or regional self-reliance, improving the operations of the local or regional water system, or improving integrated regional water management.

Public Benefit Categories

- Ecosystem improvements
- Water quality improvements
- Flood control benefits
- Emergency response
- Recreational purposes

Ecosystem Improvements Draft Definition

Ecosystem improvements, including:

- Changing the timing of water diversions that contribute to the restoration of aquatic ecosystems and native fish and wildlife
- Improvement of flow conditions, temperature, or other benefits that contribute to the restoration of aquatic ecosystems and native fish and wildlife

Ecosystems include aquatic and terrestrial habitats and natural communities.

Water Quality Improvements Draft Definition

Water quality improvements are:

- Water quality improvements that provide significant public trust resources in the Delta
- Water quality improvements that provide significant public trust resources in other river systems
- Water quality improvements that clean up and restore groundwater resources

Water Quality Improvements Draft Definition (cont'd)

For purposes of the Water Storage Investment Program, fishery protection, fish and wildlife conservation, preservation of waterways in their natural state, and recreation are the public trust resources associated with water quality improvements. Therefore, water quality improvements in the Delta or in other river systems that provide these resources may be counted as public benefits. Water quality improvements that clean up and restore groundwater may also be counted as public benefits; specifically, the prevention and clean-up of contaminated groundwater, and restoring water supply in over-drafted aquifers.

Flood Control Benefits Draft Definition

Flood control benefits include, but are not limited to increases in flood reservation space in existing reservoirs by exchange for existing or increased water storage capacity in response to the effects of changing hydrology and decreasing snow pack on California's water and flood management system. This includes any flood control benefits that accrue from the reduction or prevention of the detrimental effects of flooding.

Emergency Response Draft Definition

Emergency response includes, but is not limited to securing emergency water supplies and flows for dilution and salinity repulsion following a natural disaster or act of terrorism. Emergency response benefits will qualify if water is held in storage and supply is dedicated to emergency response purposes outside of normal facility operations or average water supply for all other purposes is reduced for the expected (average) amount of water used for emergency purposes.

Recreational Purposes

Recreational purposes include, but are not limited to, recreational pursuits generally associated with the outdoors. These shall include outdoor recreation activities associated with water bodies (such as rivers, streams, lakes, wetlands, and the ocean) and wildlife refuges that are accessible to the public. Recreational benefits must be directly affected by the proposed project and be open to the public.

Questions?

Water Storage Investment Program
Process Flow Chart

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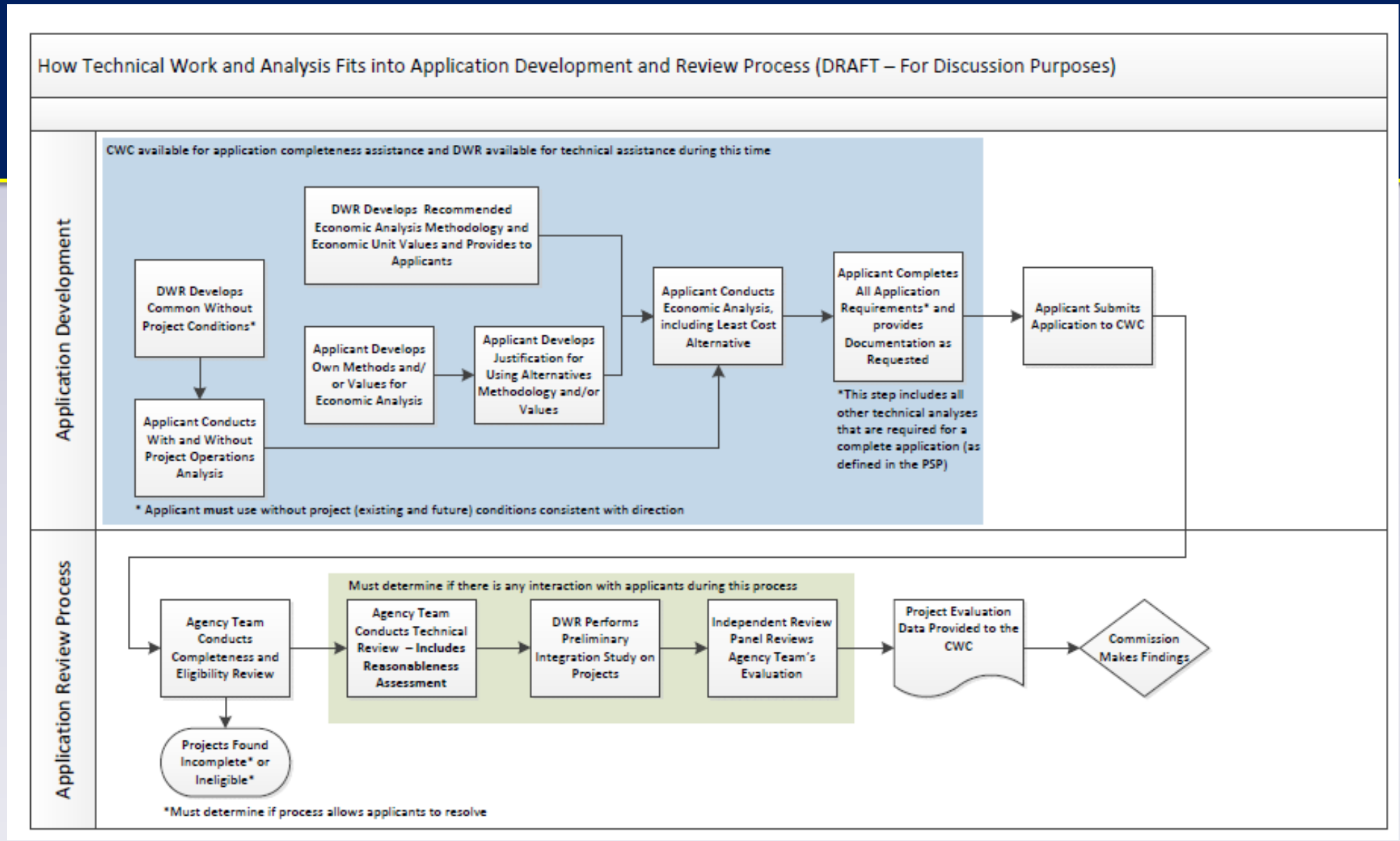

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Questions?

Break

Water Storage Investment Program
Priorities and Relative Value

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Outline of Presentation

- Ecosystem and water quality regulation language
- Initial priorities
- Relative environmental values
- Current status and next steps

Proposition 1 Chapter 8

Proposition 1 continuously appropriates $2.7 billion to the California Water Commission (CWC) for:

"public benefits associated with water storage projects that improve the operation of the state water system, are cost effective, and ***provide a net improvement in ecosystem and water quality conditions***…"

California Water Code §79754

CWC, in consultation with the CDFW, State Water Board, and DWR, to develop and adopt, by regulation, methods for quantification and management of public benefits by December 15, 2016. The regulations must include:

- Priorities and relative environmental value of ***ecosystem benefits*** as provided by the CDFW

- Priorities and relative environmental value of ***water quality benefits*** as provided by the State Water Board

2012 CDFW Ecosystem Priorities

Priorities developed in August 2012:

- Provide ***recovery for endangered and other at-risk species*** and native biotic communities
- Rehabilitate ***natural processes***
- Maintain or enhance populations of selected species for sustainable ***commercial or recreational harvest***
- Protect or restore ***functional habitat types***
- Prevent or reduce negative impacts from ***non-native species***
- Improve and/or ***maintain water and sediment quality conditions*** that support healthy ecosystems

Updating CDFW Ecosystem Priorities

More recent considerations:

- Contribute to the ***recovery of endangered, threatened and other at-risk native aquatic*** species through achieving one or more of the following:
  - Produce ***cold water to improve water temperatures*** for spawning (increase egg survival and fry rearing) of salmon and steelhead in Central Valley tributaries to Delta
  - Etc…
- Enhance ecological processes and flow regimes to support ***endangered, threatened and other at-risk native species*** through achieving one or more of the following:
  - Provide ***pulse flows*** to activate floodplains, enhance water quality, maintain channel form and function, and move gravel and sediments
  - Etc…

2012 State Board Water Quality Priorities

Priorities developed in March 2012:

- ***Improve water temperature*** conditions in water bodies on California's Clean Water Act (CWA) Section 303(d) list that are impaired for temperature
- ***Improve dissolved oxygen*** conditions in water bodies on California's CWA 303(d) list that are impaired for dissolved oxygen
- ***Mitigate or control mercury*** in water bodies on California's CWA 303(d) list that are impaired for mercury
- ***Reduce salinity concentrations*** in water bodies on California's CWA 303(d) list that are impaired for sodium, total dissolved solids, chloride, or specific conductance/electrical conductivity

2012 State Board Water Quality Priorities (cont'd)

Priorities developed in March 2012 (continued):

- Result in ***Delta tributary stream flows*** that more closely mimic natural hydrograph patterns or other flow regimes that have been demonstrated to improve conditions for aquatic life
- Create ***additional supply capacity south of the Delta***, and ***offset/reduce the current or future water demand from the Delta*** and its tributaries
- ***Clean up or restore groundwater resources*** in high use basins

Relative Environmental Values

Some considerations:

- The number of ecosystem and water quality priorities addressed
- The expected magnitude of the measurable benefits
- The certainty of achieving the benefits
- How soon the benefits will be provided
- The duration or permanence of the benefits

Current Status

Commission, DWR, CDFW, and State Water Board in the process of:

- Refining ecosystem and water quality priorities to be as specific and measurable as possible
- Developing a framework that will allow consideration of the relative environmental values of ecosystem and water quality benefits that could be realized from eligible water storage projects

Next Steps

- Continue refinement of priorities and values
- Solicit input from stakeholders
- Prepare draft regulation and guidelines language by August 2015

Questions?

Lunch Break

Water Storage Investment Program
Framework to Quantify Public Benefits

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Methods for Quantification

§79754
In consultation with the Department of Fish and Wildlife, the state board, and the Department of Water Resources, the commission shall develop and adopt, by regulation, methods for quantification and management of public benefits...

Review Key Requirements for Quantification

- Ecosystem benefits at least 50% of the public benefits funded by the State
- State's public benefit cost share not to exceed 50% of total cost*
- Projects ranked based on expected return for public investment
- Benefits to parties shall be consistent with their cost shares
- Project's public benefits are cost effective

* Does not apply to Conjunctive Use and Reservoir Reoperation projects

Why Monetize Benefits?

- All benefits measured in same unit allows for direct comparison
- Dollar to dollar comparison of benefits to costs
- Provides for a more direct ranking, e.g., return on public investment
- Can account for important differences in timing, location for the same physical benefit

Scope of Presentation/Discussion

- What is the general quantification process being contemplated?
- How will quantification of public benefits be used?
- What are economic benefits and how are they calculated?
- What are the relative advantages of physical and economic benefits?

Scope of Presentation/Discussion

- What should a benefits analysis for a storage project look like?
- How do benefits relate to cost allocation and public funding?
- What are some cost allocation methods and their potential results?
- General discussion: open scope

Typical Benefits Quantification/Cost Allocation Method

1. Define future conditions without project
2. Assess future condition with project
3. Calculate physical benefits created by or caused by the project
   a. Quantify as change relative to without project
   b. Spread over the project life
4. Estimate the economic value of physical benefits
5. Compare present value of benefits and costs
6. Allocate costs to beneficiaries

What is a Benefit Provided by a Storage Project?

- A product or service provided by the project for which people are willing to pay
  - Normally measurable in physical units
- Measured as:
  - A physical change (with-project vs. without-project futures)
  - Converted to a common measurement unit where possible
  - A sequence over the life of the project

Most Physical Benefits of Storage Projects Are Measurable in Terms of Water Quantity

- Water supply
- In-stream flow for ecosystem, temperature control and water quality
- Emergency supply
- Dedicated flood reservation space has a water supply cost that can be measured

Same water can serve more than one purpose

How to Get From Physical Benefits to Economic Benefits

- Market prices: what people are willing to pay
- Avoided costs: costs in the without-project condition that are saved because of the project.
- Alternative costs: A cost of achieving the same physical benefit by some other means
- Survey methods
- Standardized methods or models: may include one or more of methods above

Applying the Framework – Example Application

1. Define future conditions without project
2. Assess future condition with project
3. Calculate physical benefits created by or caused by the project
   a. Quantify as change relative to without project
   b. Spread over the project life
4. Estimate the economic value of physical benefits
5. Compare present value of benefits and costs
6. Allocate costs to beneficiaries

Example Benefits Calculation (each benefit the same every year)

Benefit type	Measure	Without-project	With-project	Change attributable to project
Ecosystem	Acre-feet for fish per year	0	100	100
	Value per AF, $	$380	$380	$0
	Ecosystem benefits, $	$0	$38,000	$38,000
Water Quality	AF/year for water quality	0	79	79
	Value per AF, $	$380	$380	$0
	Water quality benefits, $	$0	$30,020	$30,020
Recreation	Surface acres for recreation	0	200	200
	visitor-days	0	400	400
	Benefit per visitor-day	$20	$20	$0
	Recreation benefits, $	$0	$8,000	$8,000
Water Supply	Acre-feet for water supply	500	700	200
	Value per AF, $	$380	$380	$0
	Water supply benefits, $	$190,000	$266,000	$76,000

Example of Calculation of NPV of Costs and Benefits, $1,000

		Public Benefits			
		Ecosystem	Recreation	Other Public	**Non-public**
Year	Cost	Benefit	Benefit	Benefit	**Benefit**
2016	$1,040				
2017		$38	$8	$30	$76
2018		$38	$8	$30	$76
⇩		⇩	⇩	⇩	⇩
2033		$38	$8	$30	$76
2034		$38	$8	$30	$76
2035		$38	$8	$30	$76
NPV* (2015)	$1,000	$500	$100	$400	
Total	**$1,000**		**$1,000**	**+**	**$1,000**
*4% discount rate used for this example				**=**	**$2,000**

Cost Allocation

- Necessary step to go from benefits to cost shares to State public funding share
- Cost allocation must be feasible
  - All costs allocated
  - Each beneficiary's benefit exceeds its allocated cost, so benefits must exceed costs
  - Each beneficiary views non-participation (go-it-alone) as inferior

Cost Allocation (cont'd)

- More than one way to allocate costs. Examples:
  - Use of facilities (share of storage space or water supply)
  - Separable cost is the share of total project cost caused by a beneficiary
  - Joint Costs + Separable Costs = Total Project Costs
  - If all costs can be considered joint costs, allocate by benefit shares
  - If each beneficiary should pay at least its separable cost, use separable cost remaining benefit (SCRB) method

Relationship Between Benefit-Cost Analysis and Cost Allocation

- If all benefit categories monetized: Benefit-Cost Analysis
  - There may be a feasible cost allocation if B/C >1
  - Can see if each cost allocation is less than each benefit
  - Go-it-alone option may be covered
- If all but one benefit category monetized
  - BCA with cost-effectiveness
  - Total cost minus all monetized benefits is the minimum

Relationship Between Benefit-Cost Analysis and Cost Allocation (cont'd)

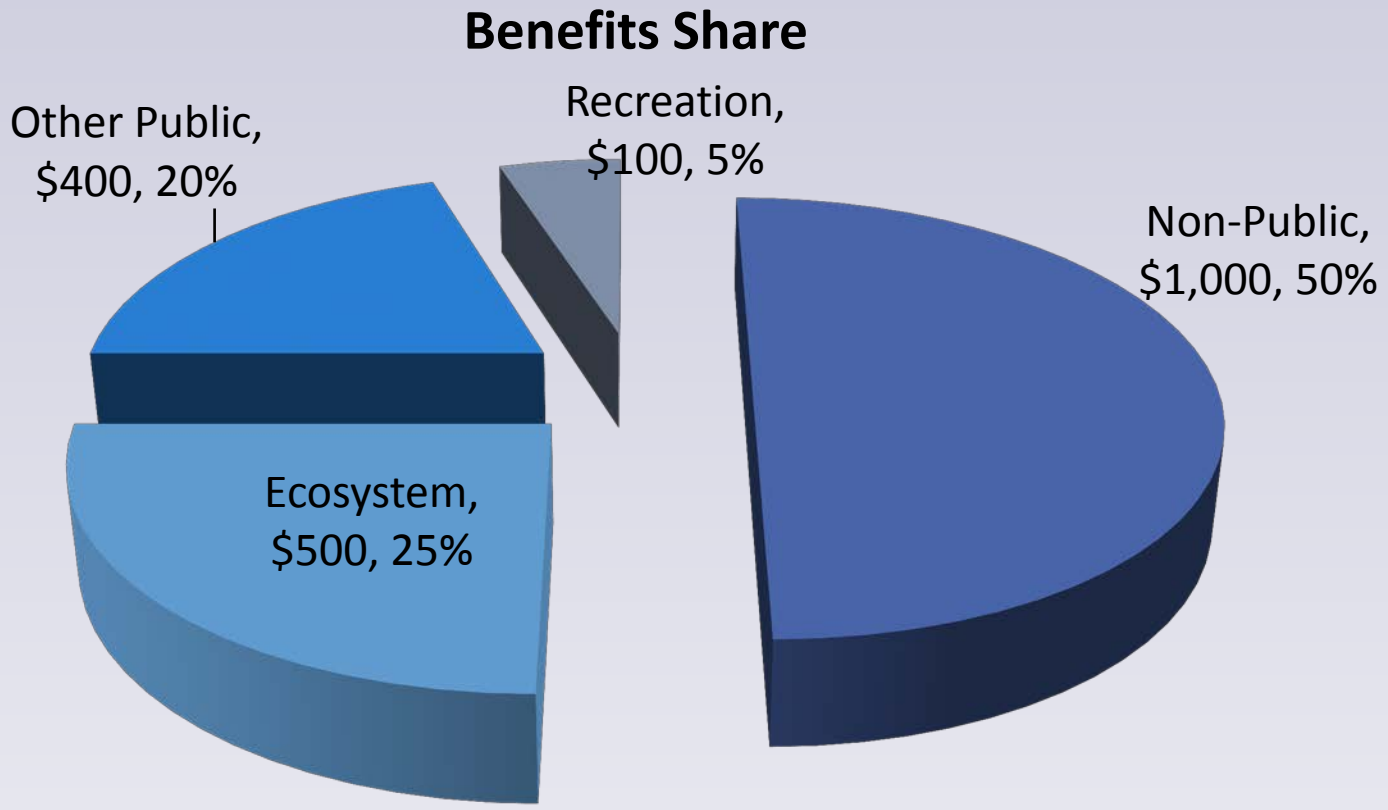
- If some benefits not monetized
  - If benefits in same physical units
    - Cost-effectiveness
    - Allocate by physical shares

Relationship Between Benefit-Cost Analysis and Cost Allocation (cont'd)

- If benefits are in different physical units
  - Can not allocate based on share of physical benefit
  - Might put more emphasis on non-quantified rankings such as "relative environmental values and priorities"
- In all cases, Commission review and decision

Cost Allocation Example – Allocate according to benefits share

1. Estimate benefits
2. Calculate benefit shares
3. Assign cost shares equal to benefit shares
4. Could be physical benefit shares, if they are the same benefit measure



Total Benefits = $2,000

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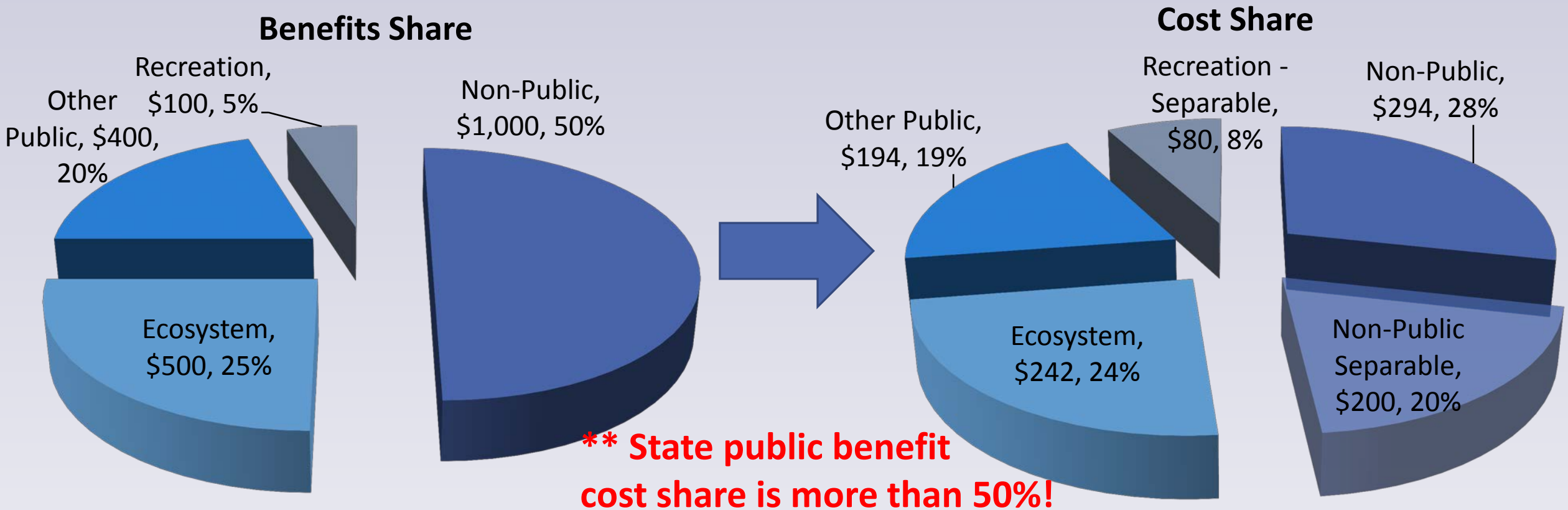
Cost Allocation Example – Separable Cost

1. Allocate cost according to share of benefit
2. Check that separable cost is not more than cost share
3. If it is, cost share = separable cost, and reallocate difference

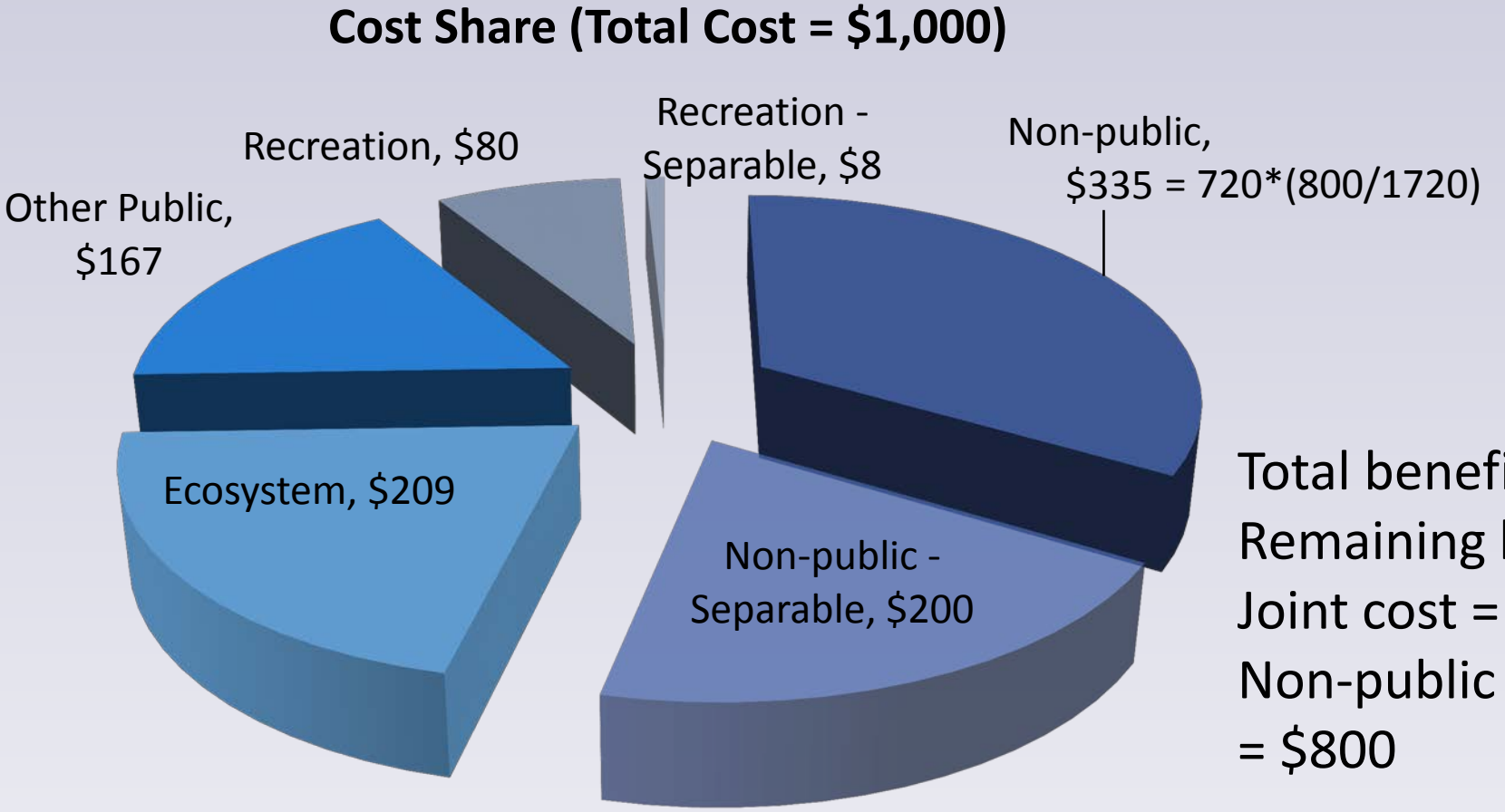
Cost Allocation Example – Separable Cost (cont'd)



**** State public benefit cost share is more than 50%!**

Recreation separable cost ($80) was more than cost share based on share of benefits ($50). $30 allocated among others according to benefit share

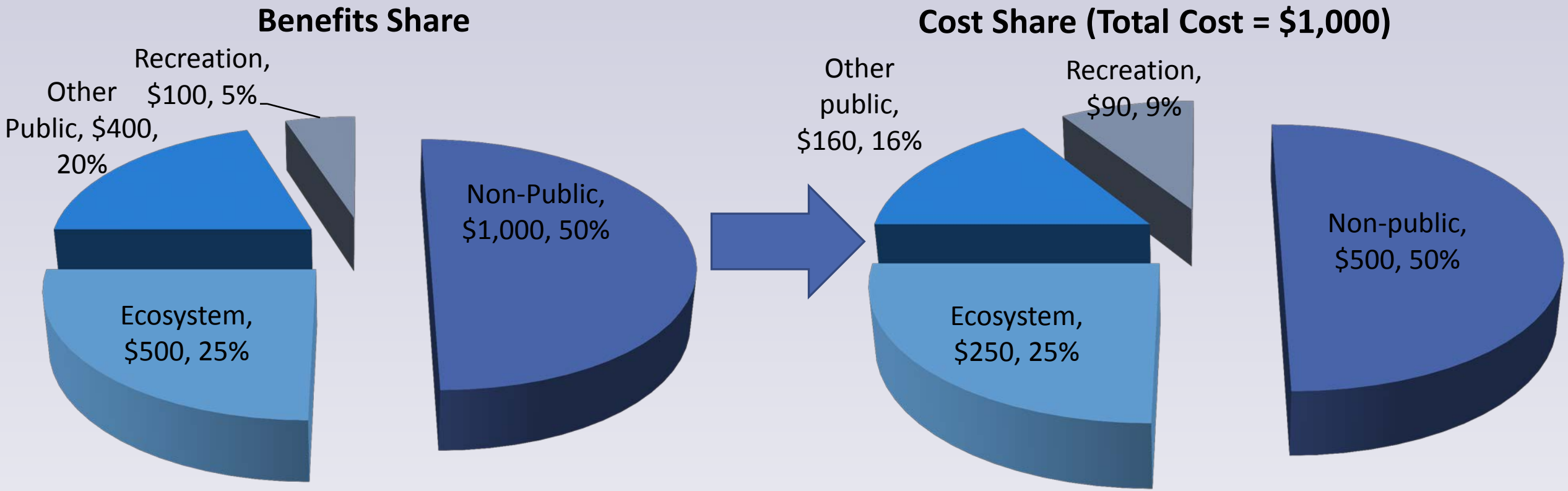
Cost Allocation Example – Separable cost remaining benefit



Ecosystem cost share is less than 50% of State public benefit cost share!

Total benefit = $2,000
Remaining benefit = $2000-$80-200 = $1,720
Joint cost = $1,000-$80-$200 = $720
Non-public remaining benefit = $1,000-$200 = $800

Cost Allocation Example – Separable cost remaining benefit (cont'd)



One possible solution: Start with benefit shares for ecosystem and non-public. Shift cost share from "other public" to recreation to cover separable cost.

Cost Allocation Summary

- Costs can be allocated based on physical benefits if all physical benefits are in the same unit.
- But if benefits < costs, someone must pay more than their benefit share
- In the feasible solution, all beneficiaries are better off
- Usually a range; the more benefits exceed costs, the larger the range
- If there are separable costs, SCRB is widely accepted
- No method can guarantee min or max cost shares on the first pass
  - Might be able to reallocate and be feasible

What Other Topics Should We Address in the Future?

We anticipate:

- Specific common assumptions and metrics
- What level of detail will be appropriate?
- What if there are benefits that cannot be quantified by physical measures?
- What if there are physical measures but economic benefits quantification is uncertain?
- How do priorities and relative environmental values figure in?

You tell us:

- What special circumstances need to be considered?
- How do we use local data?

Break

Water Storage Investment Program
Framework to Quantify Public Benefits – Facilitated Discussion

Public Comment

Water Storage Investment Program
SAC Next Steps and Action Items

California WATER COMMISSION