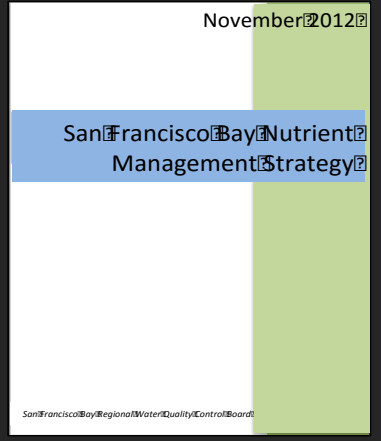
NMS SCIENCE PLAN UPDATE

Nutrient Management Strategy

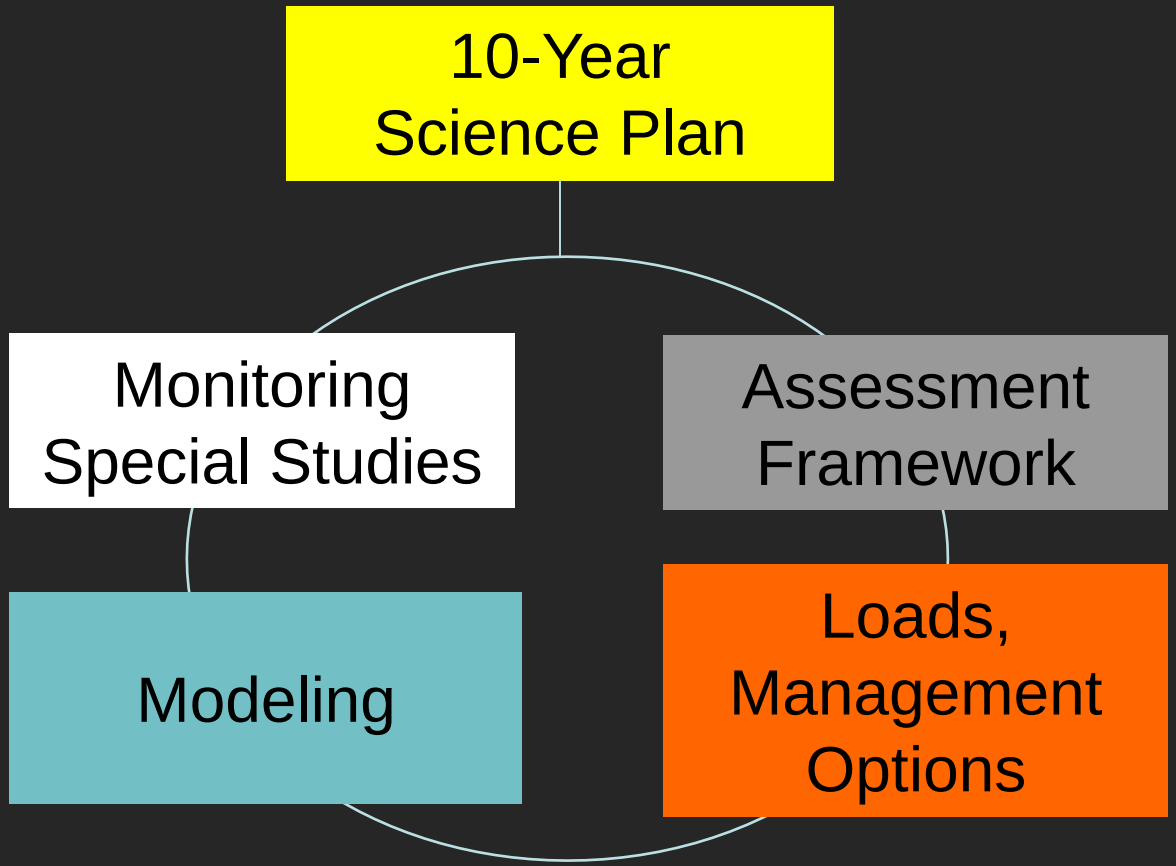


1. Nutrient sources, movement, transformations

2. Ecosystem response to nutrients
   - Causing problems?
   - Develop best-possible understanding of dose:response
   - What are protective nutrient levels? (now, future)

3. Identify Management Actions → Protective nutrients levels

NMS Program


10-Year
Science Plan
Monitoring
Special Studies
Assessment
Framework
Modeling
Loads,
Management
Options


November 2012
San Francisco Bay Nutrient
Management Strategy
San Francisco Bay Regional Water Quality Control Board

Science Plan Advisors

• Jim Cloern	USGS
• Larry Harding	U-MD, UCLA
• Wim Kimmerer	SFSU-RTC
• Raphe Kudela	UC Santa Cruz
• Mark Stacey	UC Berkeley
• Martha Sutula	SCCWRP

Management Questions

1. What conditions would be considered a level of impairment that would require regulation/management?

2. Is impairment currently occurring?

3.a To what extent are nutrients causing or contributing to current impairment? Mechanisms/quantitative
3.b What conditions (e.g., nutrient loads or concentrations) would mitigate impairment?

4.a What potential future impairments warrant pre-emptive management actions?
4.b What conditions (e.g., nutrient loads or concentrations) would mitigate impairment?

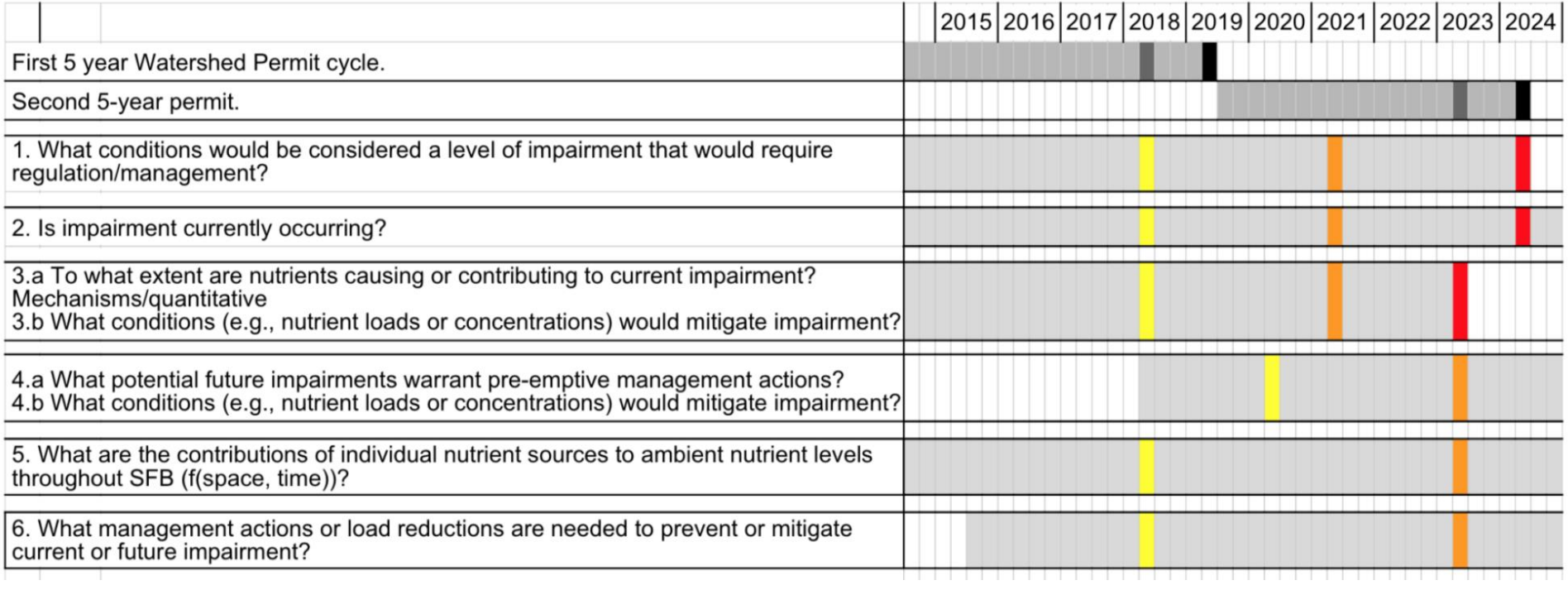
5. What are the contributions of individual nutrient sources to ambient nutrient levels throughout SFB (f(space, time))?

6. What management actions or load reductions are needed to prevent or mitigate current or future impairment?

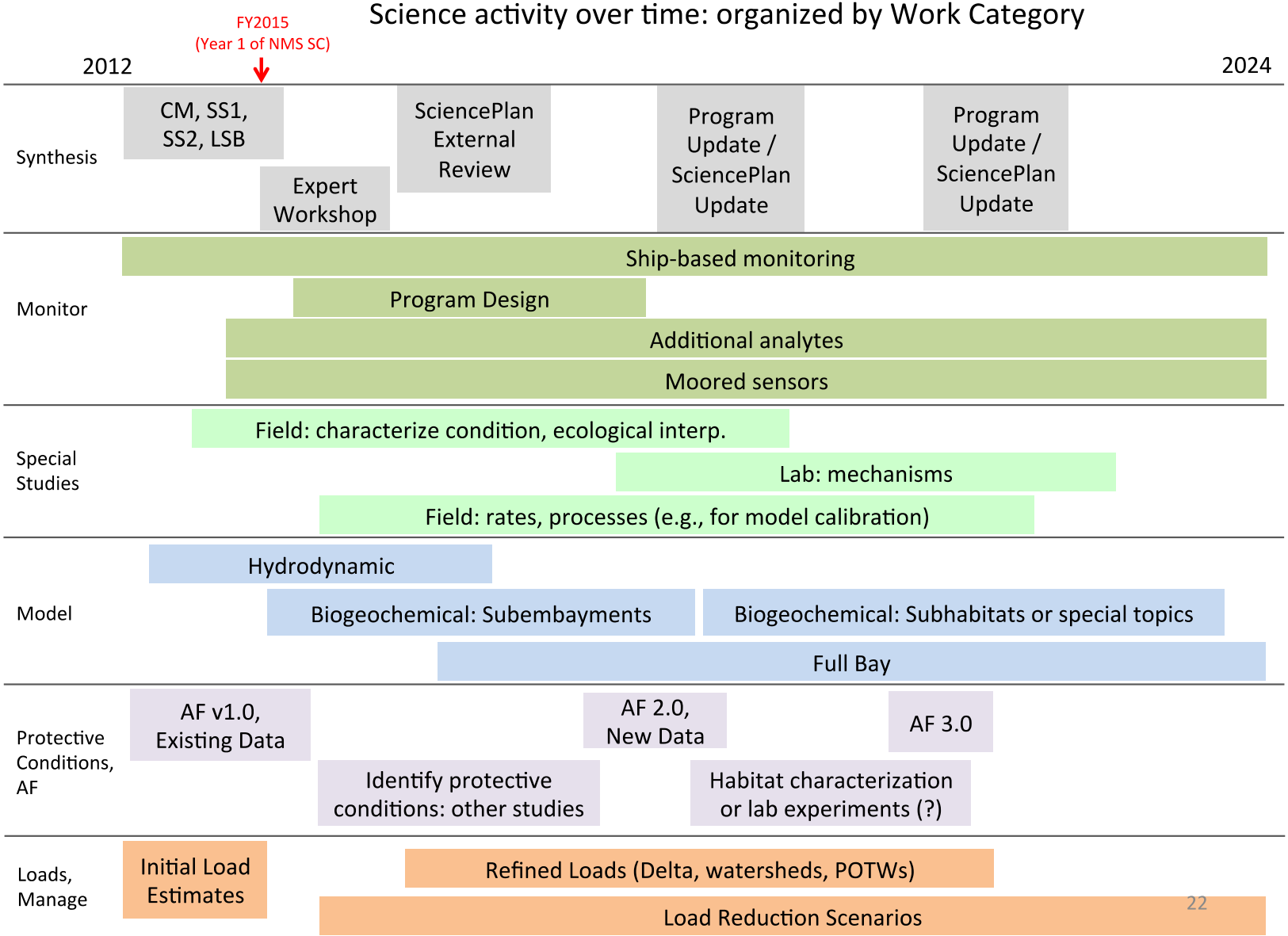
Water Board's goal: 'Standards within 10 year'

Approximate Timeline for addressing major management questions

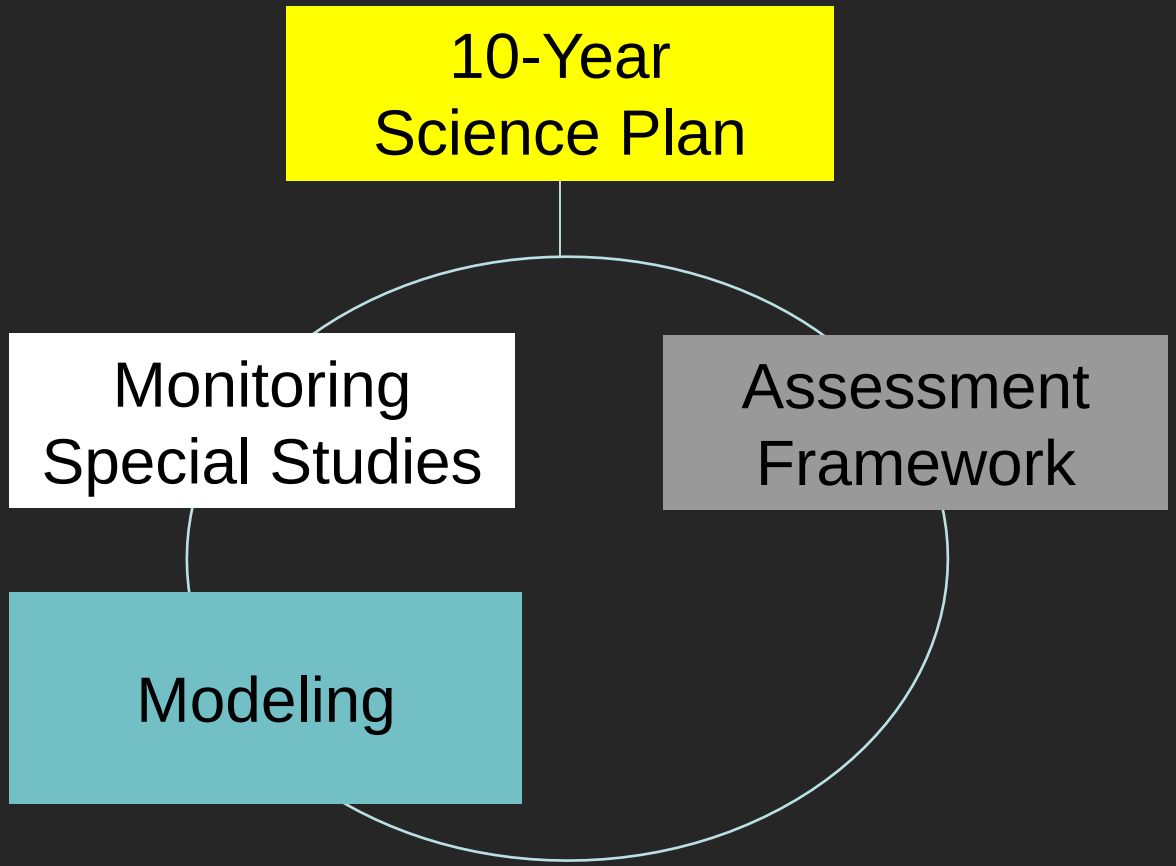
- Realistic time for science and process
- Assumes work proceeding in parallel on all fronts.
- 'Answers' are reached iteratively, with increasing level of confidence over time.
- Plan not constrained by budget. Targets breadth of issues and timeline



Science activity over time: organized by Work Category



NMS Program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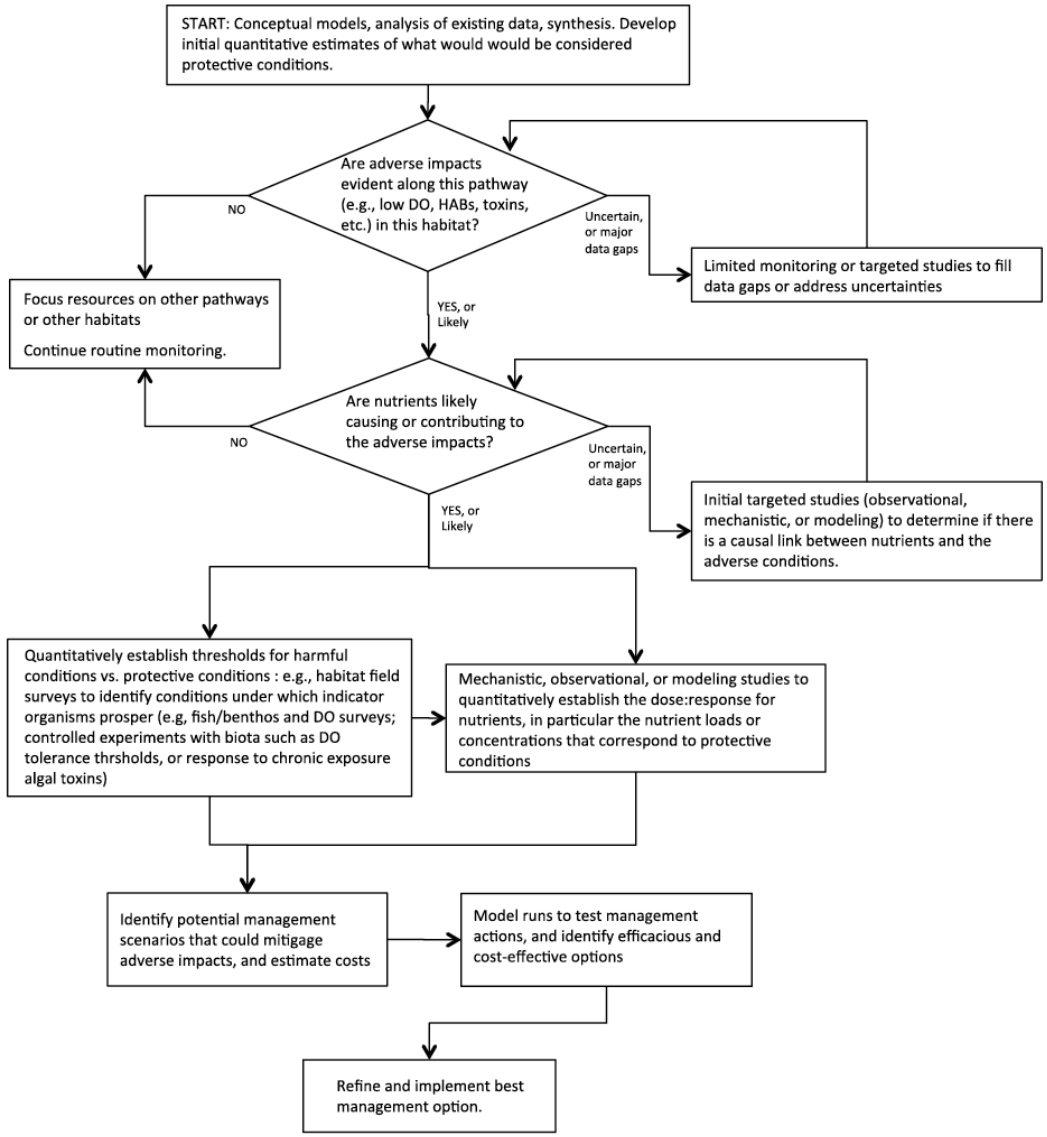

START: Conceptual models, analysis of existing data, synthesis. Develop initial quantitative estimates of what would would be considered protective conditions.
Tier 1
Are adverse impacts evident along this pathway (e.g., low DO, HABs, toxins, etc.) in this habitat?
NO
Uncertain, or major data gaps
Limited monitoring or targeted studies to fill data gaps or address uncertainties
Tier 2
Focus resources on other pathways or other habitats
Continue routine monitoring.
YES, or Likely
Are nutrients likely causing or contributing to the adverse impacts?
NO
Uncertain, or major data gaps
Initial targeted studies (observational, mechanistic, or modeling) to determine if there is a causal link between nutrients and the adverse conditions.
Tier 3
YES, or Likely
Quantitatively establish thresholds for harmful conditions vs. protective conditions : e.g., habitat field surveys to identify conditions under which indicator organisms prosper (e.g, fish/benthos and DO surveys; controlled experiments with biota such as DO tolerance thrsholds, or response to chronic exposure algal toxins)
Mechanistic, observational, or modeling studies to quantitatively establish the dose:response for nutrients, in particular the nutrient loads or concentrations that correspond to protective conditions
Tier 4
Identify potential management scenarios that could mitigage adverse impacts, and estimate costs
Model runs to test management actions, and identify efficacious and cost-effective options
Tier 5
Refine and implement best management option.
Tier 6

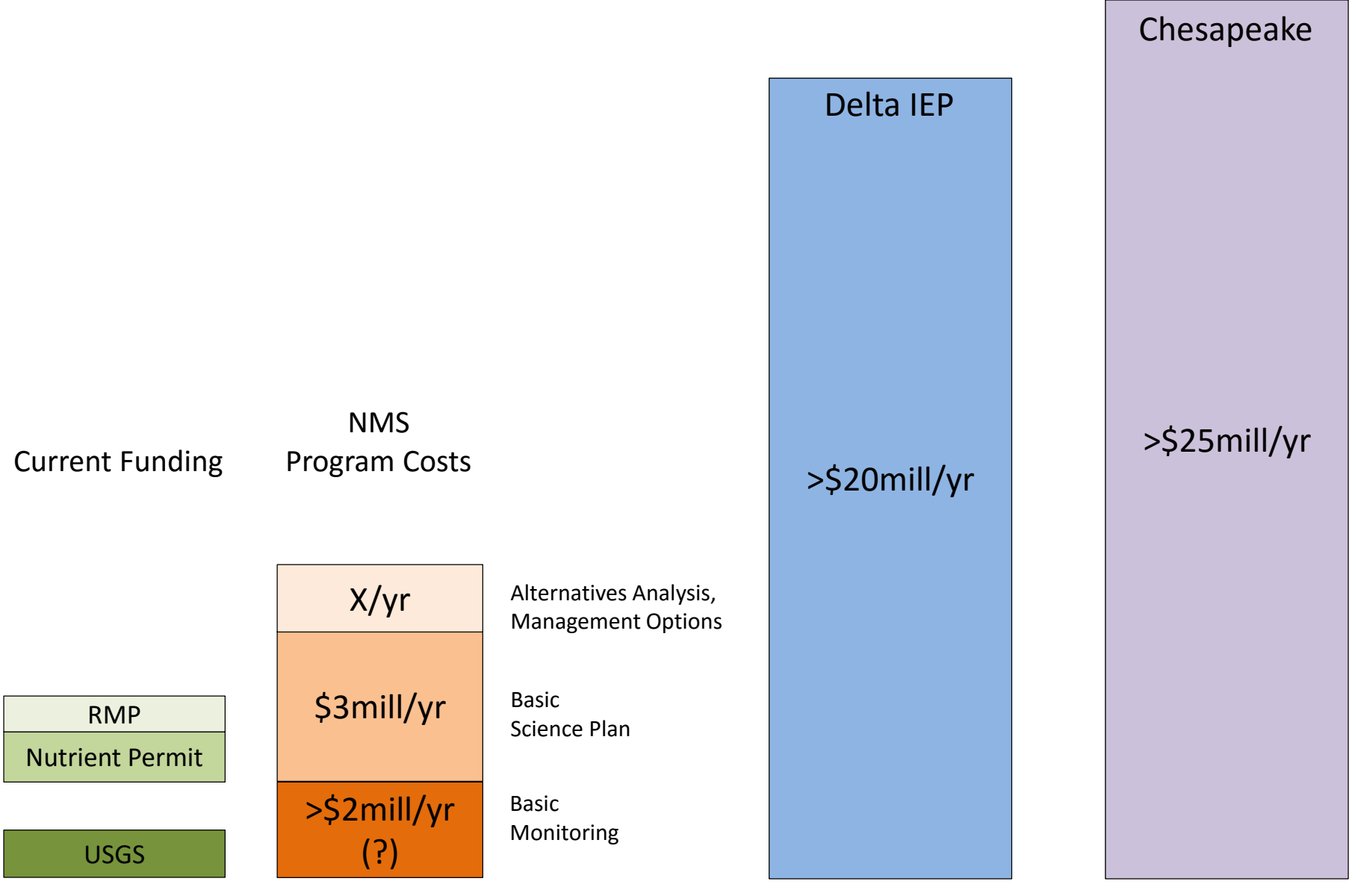
Science Plan Peer Reviewers

Walter Boynton
University of Maryland

Jim Hagy
USEPA-ORD

Major Peer Review Comments

- Science program and sequence of studies are appropriate
- Potential improvements
  - Add more effort on fish, benthos and higher trophic levels
  - Confirm the focus on HABs
- $1.4 million budget is not sufficient
- 10-year program will need to be extended


Current Funding
NMS
Program Costs
Delta IEP
>$20mill/yr
Chesapeake
>$25mill/yr
X/yr
Alternatives Analysis,
Management Options
$3mill/yr
Basic
Science Plan
>$2mill/yr
(?)
Basic
Monitoring
RMP
Nutrient Permit
USGS

FY2017 Proposed

	CORE PROGRAM	Cost	Cumulative Total
C.1	Channel Monitoring	152700	152700
C.2	Basic Modeling	265200	417900
C.3	Moored sensor / DO /biogeochem	239800	657700
C.4	Data Analysis / Synthesis	82969	740669
C.5	Science Program Coordination	263125	1003794
C.6	Program managmement	59426	1063220
	Core Program subtotal	***1063220***	
	PROJECTS		
P.1	Monitoring Program Development	75755	1138975
P.2	Vertical DO profiles in sloughs/creeks	59780	1198755
P.3	Approach to DO/habitat characterization	135438	1334193
P.4	Toxin in mussels	70400	1404593
P.5	Remote Sensing, Feasibility/Model calibration/validation	53365	1457958
P.6	HABs lab/field investigation	142100	1600058
P.7	Modeling, Suisun	225850	1825908
P.8	Modeling, Scenarios...HABs, coupling with coast, ...	205850	2031758
P.9	Modeling slough/creeks/ponds	113250	2145008
P.10	Fish/benthos Field investigations for DO, augmenting Ho	50000	2195008
P.11	Data Management	33040	2228048
P.12	Program review	40000	2268048
	Projects subtotal	***1204828***	FTE_
	Total	**2268048**	

Must-Dos Within Budget

Must-Dos Exceeding Budget

High-Priority Exceeding Budget

Program Coordination FY16-17 Workplan

SF Bay Nutrient Management Strategy

NMS Program Planning Objectives:

1. Continue directing Science Program: grow, improve efficiency

2. Expand and enhance stakeholder engagement and program management. Strategically build program: FUNDRAISE, PARTNERSHIPS

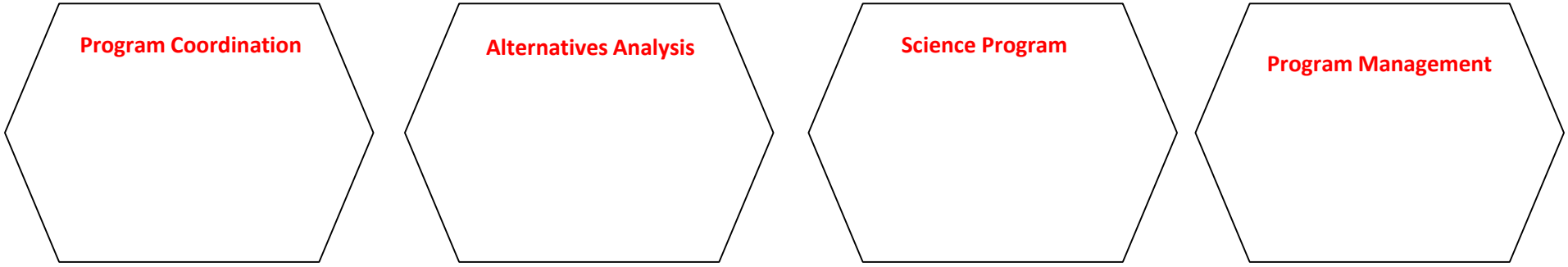
3. Build and direct new technical program: Alternatives Analysis, Policy Analysis
    a. Economic Analysis of Implementation Alternatives
    b. Policy approaches
    c. Multiple benefits

4. Manage NMS process: Steering Comm, Planning SubComm

5. Pro-active and Transparent Program
    a. Learn from other estuaries
    b. Do it “right”…Genuine joint fact finding, unbiased science, external review

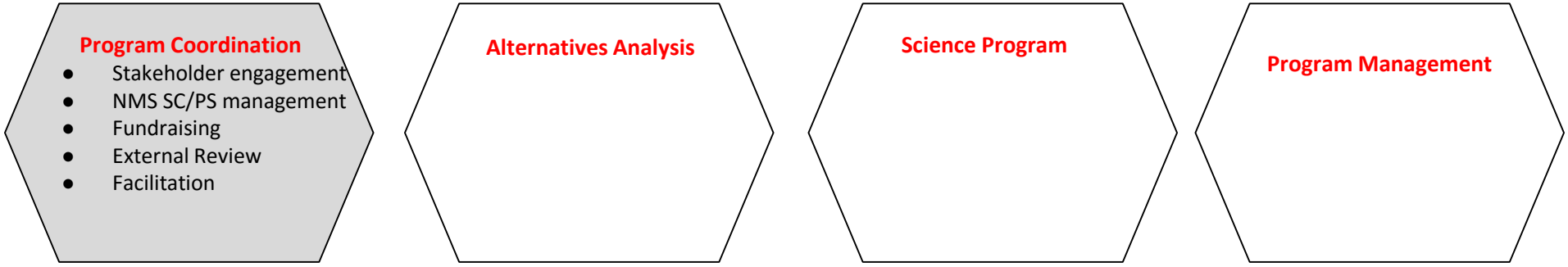
San Francisco Bay Nutrient Management Program

Core Activities / Program Areas



San Francisco Bay Nutrient Management Program

Program Coordination



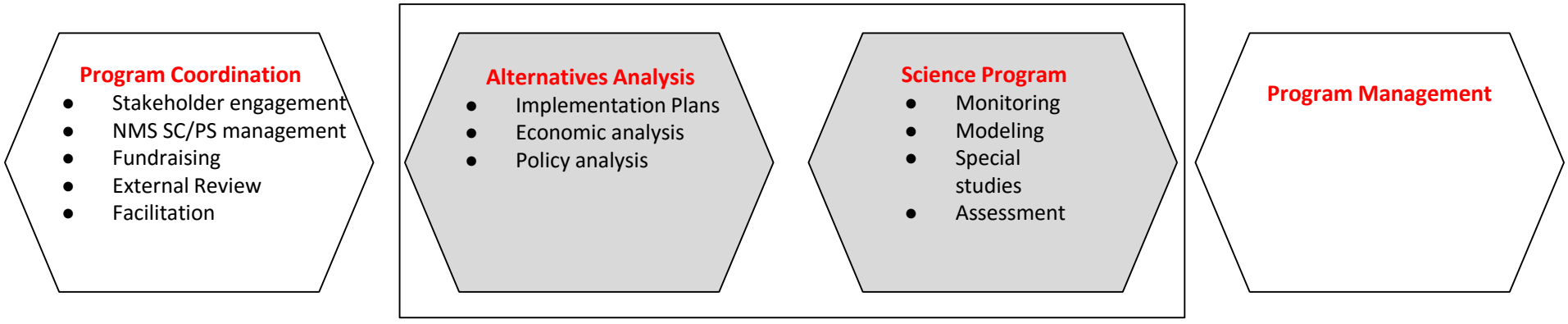
- Strategic program development and growth
- Pursue external resources: federal and state grants, coordination and in-kind funding from state/federal agencies
- Stakeholder engagement
- Manage NMS SC, PS, and other subcommittees
- Facilitation

Started…

- Fundraising Plan. Goals:
  - $250k 'new' money
  - $250k real match
  - Path to major partnerships

San Francisco Bay Nutrient Management Program

Technical Program



- Coordinated Technical Program
  - ❖ Bay Science ←→ Alternatives Analysis
  - ❖ Alternatives Analysis work conducted in a similar manner as Science Program (expert advisors, external collaborators, guided by SC)
- Work proceeds through…
  - ❖ Hands-on technical work by NMS staff
  - ❖ Directing Teams of Expert Collaborators and Technical Advisors

San Francisco Bay Nutrient Management Program

Program Management

Program Coordination
- Stakeholder engagement
- NMS SC/PS management
- Fundraising
- External Review
- Facilitation

Alternatives Analysis
- Implementation Plans
- Economic analysis
- Policy analysis

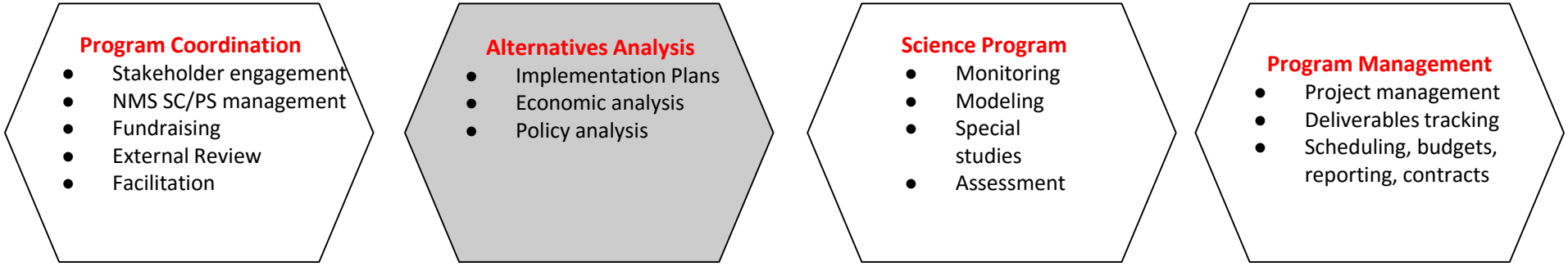
Science Program
- Monitoring
- Modeling
- Special studies
- Assessment

Program Management
- Project management
- Deliverables tracking
- Scheduling, budgets, reporting, contracts

- Consistent, reliable project management
- Efficiency: Leverage SFEI/RMP program management practices and tools
- Single point of contact for all financials and deliverables

San Francisco Bay Nutrient Management Program

Alternatives Analysis



- Yr1: Case studies from other estuaries: trading, multi-benefits, policies.
- Yr1: Multi-year work plan for evaluating management alternatives and policy approaches

Project Tasks	Anticipated Completion	Estimated Additional Cost (FY2016-2017)
Task 1: Program Coordination		**$45,000**
Task 1.1: Stakeholder engagement and outreach	on-going	$10,000
Task 1.2: Fundraising, strategic partnerships	on-going	$15,000
Task 1.3: NMS SC and PS coordination, and facilitation	on-going	$20,000
Task 2: Program Management		**$5,000**
Task 2.1: Financial management and reporting, deliverable tracking	on-going	$0 [a]
Task 2.2: Other Program management activities	on-going	$5,000
Task 3: Alternatives Analysis		**$50,000**
Task 3.1: Case study white paper	Draft: Oct 2016 Final: Jan 2017	$25,000
Task 3.2 Develop Alternative Analysis 5-year workplan, including convening technical advisory group, stakeholder input	Draft: Dec 2017 Final: Mar 2017	$25,000 (includes $10k for honoraria)
Task 3.3 Implement Alternative Analysis workplan	FY2018-on-going	$0 [b]