From: Storm, Linda
To: Manaloor, Valsala
Subject: Fw: Corps comments on NOAA"s shellfish aquaculture and SAV (submerged aquatic vegetation) interactions national FW: [EXTERNAL] Fwd: Shellfish aquaculture and SAV interactions (UNCLASSIFIED)
Date: Monday, November 02, 2015 11:18:09 AM
Attachments: NOAA CAPES Comments 4_15_15.doc
CAPES SAV assessment outline_Morris.pdf
CAPES 2020 Booklet 12 March 2015_1.1.pdf

(b) (5) [redacted]

(b) (5)

[redacted]

-----Original Message-----
From: Bennett, Matthew J NWS
Sent: Wednesday, April 15, 2015 11:05 AM
To: Ken Riley - NOAA Affiliate
Cc: Laura Hoberecht - NOAA Federal; Dumbauld, Brett; Steve Rumrill; Lund, Perry (ECY); REEVES, BLAIN (DNR); J. Ruesink; kaldy.jim@epa.gov; Dave Risvold; McReynolds, Ryan; Sanguinetti, Pamela NWS; Pozarycki, Scott V NWS
Subject: RE: [EXTERNAL] Fwd: Shellfish aquaculture and SAV interactions (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Mr. Riley,
Thank you for the opportunity to comment on the draft writing outline. The Seattle District comments are provided on the attached document. Given the review period, comments are brief. Please let me know if you have comments or need clarification. Thank you.

Matthew J. Bennett, Chief
North Puget Sound Section
Corps of Engineers Regulatory Branch
206.764.3428
matthew.j.bennett@usace.army.mil

-----Original Message-----
From: Laura Hoberecht - NOAA Federal [mailto:laura.hoberecht@noaa.gov]
Sent: Wednesday, April 01, 2015 4:38 PM
To: Dumbauld, Brett; Steve Rumrill; Lund, Perry (ECY); REEVES, BLAIN (DNR); J. Ruesink; kaldy.jim@epa.gov; Dave Risvold; Bennett, Matthew J NWS; McReynolds, Ryan
Cc: Ken Riley - NOAA Affiliate
Subject: [EXTERNAL] Fwd: Shellfish aquaculture and SAV interactions

Hi all,

I am forwarding an email from James Morris, with the NOAA-NOS-CAPES program, requesting review of a writing outline for a 'State of Science Assessment of Shellfish Aquaculture Interactions with SAV'. This is the starting point for a national level document that will help inform resource managers involved in permitting shellfish aquaculture.

Your input on this short draft would be greatly appreciated. Please send comments directly to Ken Riley (cc'd here) by **April 15, 2015**.

This is an exciting opportunity to contribute to an important and useful assessment. Please let me know if you have any questions or recommendations of others to include.

Thanks in advance for your input,

Laura
<>< <>< <>< <>< <>< <>< <>< ><>
Laura Hoberecht, PhD
WCR Aquaculture Coordinator
NOAA National Marine Fisheries Service
7600 Sand Point Way
Building 1 (F/NWR2)
Seattle, WA 98115

ph: 206-526-4453
cell:206-549-6078
fax: 206-526-6736
e: laura.hoberecht@noaa.gov
><> ><> ><> ><> ><> ><> ><> <><

---------- Forwarded message ----------
From: James Morris - NOAA Federal <james.morris@noaa.gov>
Date: Wed, Mar 18, 2015 at 9:12 AM
Subject: Shellfish aquaculture and SAV interactions
To:

Hi Everyone,

We would like to request your input on a writing outline for a State of Science Assessment on Shellfish Aquaculture Interactions with SAV. We are working on this assessment in preparation of the Nationwide 48 permit renewal in March of 2017. Once we complete this assessment, we will be working with coastal manager working groups (consisting of district and regional Army Corps of Engineers and NMFS Habitat programs) nationally to advance understandings of shellfish aquaculture and SAV interactions. Our intent is to demonstrate the science behind the various interactions with SAV including both positive and negative. We hope that this work will give managers higher confidence with siting shellfish aquaculture around the U.S.

We would be very grateful for your input into this writing outline. We want to make sure we are not missing any opportunities to demonstrate interactions. We will be reaching out to many of you for direct input for drafting sections of which you have specialized expertise.

Please see attached writing outline. We would very much appreciate your input by April 15, 2015.
To learn more about our CAPES program and similar efforts we have underway, please see attached CAPES handout.

Warmest regards,

James

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James A. Morris, Jr., Ph.D.
Marine ecologist
Center for Coastal Fisheries and Habitat Research
National Centers for Coastal Ocean Science
National Ocean Service, NOAA
101 Pivers Island Rd., Beaufort, NC 28516
Wk 252.728.8782 Cell 252.515.0214 Fax: 252.728.8784
Skype: jamesamorrisjr
Twitter: @jamesamorrisjr

Learn about CAPES and how we are growing sustainable marine aquaculture practices at
http://coastalscience.noaa.gov/research/scem/marine_aquaculture

Check out this CAPES presentation given at the 2014 Hawaii Conservation Conference:
http://vimeo.com/103860019

Publications: http://scholar.google.com/citations?user=HhdmVS8AAAAJ&hl=en

Biographical: http://www.externalaffairs.noaa.gov/communicator/noaacom_22.html
http://oceanservice.noaa.gov/profiles/oct11/morris.html

Classification: UNCLASSIFIED
Caveats: NONE

Classification: UNCLASSIFIED
Caveats: NONE

US Army Corps of Engineers
Seattle District

April 15, 2015

Subject: Seattle District Army Corps of Engineers Comments on Draft Shellfish Aquaculture and SAV Interactions Outline (NOAA-NOS-CAPES program)

Overall: we encourage a clear description of the regional differences in SAV, shellfish aquaculture and sites; e.g. cultivation of native shellfish species vs. non-native and invasive shellfish species and estuary characteristics (i.e, depth, tidal influence, land-use practices). This would inform your discussion of interactions between shellfish aquaculture and SAV. We also encourage you to include highly experienced SAV scientific expertise with strong understanding of general SAV ecology and ecosystem function in developing this assessment. Commercial shellfish aquaculture and SAV are fundamentally different at the most basic level (e.g., primary producers vs. secondary producers) with all of the associated differences in ecosystem function.

For your consideration:
a. Shellfish Aquaculture section lists "bottom screens" under clam culture and geoduck culture. In Washington State these are actually "nets", often termed as "cover nets" which are typically made from polypropylene.

b. Under the section "Habitat Equivalency of Shellfish Aquaculture and SAV": the ecosystem function list is not supported. Refer to your list under SAV: Critical Habitat. SAV are internationally known as high primary production systems. Whereas, the ecosystem functions of shellfish aquaculture are expected to vary by cultivation type, species (e.g., native shellfish vs non-native and invasive shellfish), and region. Shellfish aquaculture does not provide: provision of food for coastal food webs, provision of oxygen to waters and sediment, detritus-based food web, export of carbon to adjacent ecosystems, carbon sequestration, and pH reduction. There would also be important regional considerations between shellfish aquaculture and SAV in their ability to prevent sediment re-suspension, provide wave attenuation and shoreline protection, improve water transparency, trap and cycle nutrients, and provide habitat for microbes, invertebrates and vertebrates.
Also, in regards to the habitat equivalency component, include a time element. For example, comparison of a 'mature' eelgrass bed with a 'mature' oyster reef has limited habitat equivalency meaning if the oyster reef will be removed by harvest and therefore only exists in that state for a short timeframe. There is also seasonal and other variation association with SAV. Variability in the habitat over time due to harvest/aquaculture management or seasonal factors is important to this issue.

c. Under the section “Regional Considerations”:

- Identify trends in SAV area on a regional scale.
- Identify goals of regional, science-based agencies, such as Washington State’s Puget Sound Partnership, which has identified recovery targets for *Zostera marina* in Puget Sound.
- Differentiate between native shellfish and non-native and invasive shellfish interactions with SAV.

If you have further questions, we are available to provide more details or provide references.

CAPES Program
National Centers for Coastal Ocean Science
National Ocean Service

CAPES State of Science Assessment

Shellfish Aquaculture Interactions with Submerged Aquatic Vegetation

INTRODUCTION/OVERVIEW

- The issue - shellfish aquaculture interactions with SAV
- The shellfish aquaculture industry and types of habitats utilized
- Significant impacts - what is an "impact" and what is "significant"
- Concerns with SAV impacts
- Scope of this assessment
- Regulatory requirements
    - U.S. Army Corps of Engineers (ACOE)
    - National Oceanic and Atmospheric Administration (NOAA)
    - U.S. Fish and Wildlife Service (FWS)
    - U.S. Environmental Protection Agency (EPA)
    - State regulatory agencies
    - Local regulatory agencies

SHELLFISH AQUACULTURE

- Overview of shellfish aquaculture gear, working practices, and stewardship roles
- Site selection (substrate composition, water depth, wave/wind action, tidal/subtidal location, salinity, food supply, pollution, predation, disease, regulatory jurisdiction)
- Oyster culture
    - Species and biology
    - Growout site characteristics
    - Bottom culture
    - Longline
    - Stake
    - Hanging basket
    - Rack and bag
    - Cages
    - Floating cage and bag systems (flipbags, Taylor floats, oyster grow)
- Clam culture
    - Species and biology
    - Growout site characteristics
    - Bottom screens
    - Bags

- Geoduck culture
    - Species and biology
    - Growout site characteristics
    - Bottom culture (screens)
    - PVC tubes
- Minor shellfish species culture
    - Scallops
    - Sun ray venus
    - Conch
- Other shellfish aquaculture gear
    - Water-based raceway systems (floating upwelling system)
    - Mechanical seeding and outplanting
    - Mechanical harvesting
    - Anchors and anchoring
    - Vessels and other marine equipment

SAV: A CRITICAL HABITAT

- Definition of SAV
- Types of SAV
- Monitoring SAV: monitoring specifications, survival, shoots and roots, areal coverage
- SAV protections and "no-net-loss" of ecological function
- Ecosystem functions of SAV
- Trends in SAV abundance and distribution nationally
- Vulnerability and susceptibility of SAV ecosystems
- SAV carrying capacity
- Ocean acidification and SAV
- Limitations to SAV growth
- Inter-annual variability

SHELLFISH AQUACULTURE AND SAV INTERACTIONS

- Negative interactions
    - Mechanisms that can result in direct loss of SAV biomass
        - Gear impacts
        - Working practices impacts
        - Cumulative impacts with other stressors
- Positive interactions
    - Mechanisms that can result in direct gain of SAV biomass
        - Colonization of SAV on and around gear
        - Increased water clarity and light penetration
        - Sediment enrichment
        - Sediment stabilization
        - Wrack and seedling retention
        - Reduced desiccation (geoduck)

HABITAT EQUIVALENCY OF SHELLFISH AQUACULTURE AND SAV

- The case for habitat equivalency
  - Comparison of ecosystem functions between SAV and shellfish aquaculture
- Net impact assessment approaches
- Ecosystem functions not provided by shellfish aquaculture
  - Wrack
- Ecosystem functions not provided by SAV
  - Increased habitat complexity and productivity

REGIONAL CONSIDERATIONS

- Tidal exchange and SAV
- Species compositions and regional trends
- Non-native and invasive SAV

SAV MONITORING AND EVALUATION

- Site surveys prior to siting/impact
- SAV mapping

SAV MITIGATION AND RESTORATION

- Loss of SAV habitat
- Mitigation as a management tool
- Pitfalls in mitigation and restoration processes
- Functional equivalence of planted and naturally-occurring SAV

The **Coastal Aquaculture Planning and Environmental Sustainability (CAPES)** program supports NOAA and NCCOS missions by delivering science-based decision support tools to local, state, and federal coastal managers. The CAPES program works to support coastal planning for marine aquaculture including operating, monitoring, and assessing aquaculture impacts in coastal environments.

Learn about CAPES and how we are growing sustainable marine aquaculture practices at: http://coastalscience.noaa.gov/research/scem/marine_aquaculture or contact Dr. James Morris at James.Morris@noaa.gov.

Coastal Aquaculture Planning & Environmental Sustainability

STRATEGIC PLAN 2015 - 2020

We combine the best research, modern management approaches, and lessons from the field to promote sustainable industry while maintaining ecosystem health.

National Ocean Service
National Centers for Coastal Ocean Science

As part of NOS, the CAPES Program specializes in understanding environmental interactions of aquaculture within marine ecosystems. CAPES interdisciplinary scientists leverage NOS experience to address ocean use conflicts, support public outreach and education efforts, and increase awareness of the environmental, economic, and social opportunities aquaculture provides coastal communities.

OUR FOCUS

1 Environmental Assessments & Ecological Forecasts

While aquaculture operations endeavor to achieve economic profitability, regulators, scientists, and the public are concerned about the long-term environmental sustainability. CAPES scientists strive to understand how aquaculture functions within the context of the coastal ecosystem in which it is located. Key research topics encompass monitoring and modeling approaches to assess cumulative effects on water quality, the seafloor, and biodiversity.

2 Marine Spatial Planning to Inform Siting

CAPES develops science-based decision tools for planning, scoping, authorizing, and mitigating ocean use to allow space for aquaculture development. Integrating GIS technology with ecological data results in strategies for siting aquaculture operations in consideration of regulatory and management priorities and stakeholder interests. Spatial planning helps reduce user conflicts by providing opportunity for regulators, operators, and other stakeholders to coordinate site selection.

3 Climate Change Effects

It is largely unknown how climate change will affect marine aquaculture. Investigations are needed that characterize metabolic responses to temperature increase, acidification, sea level rise, changes in salinity, and species range shifts. Interactions of these issues with wild capture fisheries could result in changes in national policies regarding U.S. seafood production.

4 Innovative Technology and Sustainable Practices

Research on efficient, low impact marine aquaculture is critical to develop an environmentally, economically, and socially responsible industry. Key research areas are recirculating aquaculture and effluent treatment systems, identifying candidate species, developing alternative feeds, and feed allocation technology. Promising work will evaluate integrated multi-trophic aquaculture and implementation of restoration aquaculture.

DID YOU KNOW?

Aquaculture is the fastest growing U.S. food sector

Aquaculture supplies over 50% of all seafood produced for human consumption.

Over 91% of seafood eaten in the U.S. is imported.

NOAA and DOC policies work to increase domestic aquaculture production.

There are 95,000 miles of coastline in the U.S where seafood could be farmed.

Our Mission

We provide tools and services for coastal managers empowering them to maintain healthy, resilient ecosystems while supporting aquaculture development in the coastal zone.

WE SERVE COASTAL MANAGERS

Legislation and policy strongly call for NOAA to support marine aquaculture development through research partnerships, development of a coordinated regulatory framework for marine aquaculture, business incentives, streamlined environmental review and permitting, technology transfer, and outreach and education.

CAPES strongly supports White House, Department of Commerce, and NOAA strategic goals and initiatives including:

- **NCCOS Strategic Plan**
- **NOS Priorities Roadmap**
- **NOAA and DOC Aquaculture Policies**
- **National Strategic Plan for Federal Aquaculture Research**
- **National Ocean Policy Implementation Plan**
- **National Ocean Council Marine Planning Handbook**

CAPES helps **FEDERAL MANAGERS** in NOAA, the Environmental Protection Agency, Army Corps of Engineers, Fish and Wildlife Service and Bureau of Ocean Energy Management during permit consultation to evaluate how marine aquaculture affects their area of authority.

CAPES provides **REGIONAL MANAGERS** with the science to inform decisions under a national framework, but with relevance at regional scales, like communicating positive and negative impacts of aquaculture on regional habitats.

Marine aquaculture occurs in every coastal state. CAPES works with **STATE MANAGERS** to inform monitoring requirements, assess carrying capacity, develop educational materials, and apply national perspectives to state issues.

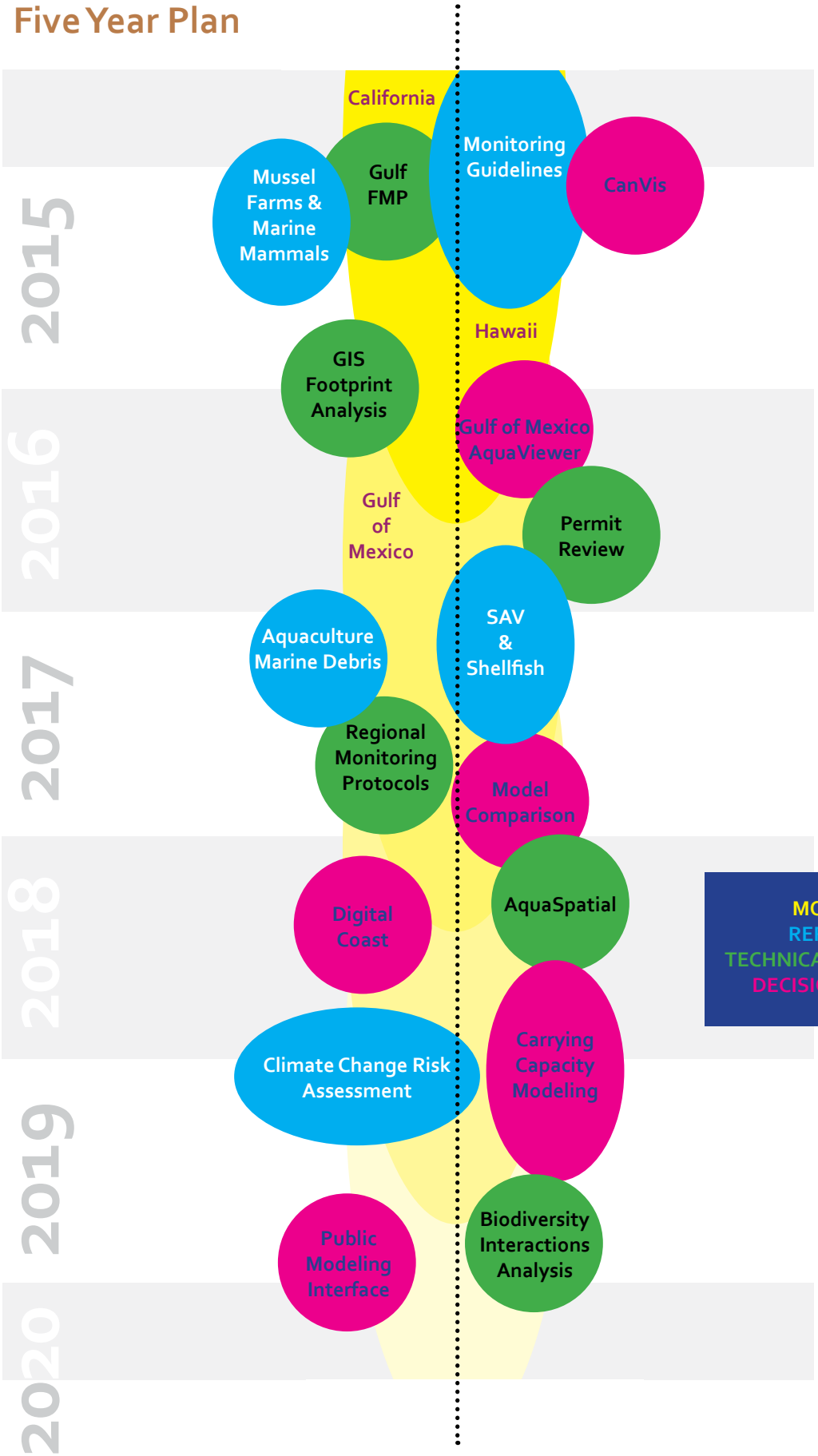
Coastal aquaculture practices can be heavily influenced by local perceptions and societal values, especially on issues related to seascape changes and pollution. CAPES tools are being used by **LOCAL MANAGERS** to visually

We foster close working relationships with coastal managers, and scientific, regulatory and industry partners to guide our work and ensure we are responding to immediate and long-term needs.

Our Vision

Healthy and resilient coastal communities with environmentally and economically sustainable aquaculture.

Five Year Plan



MODELS
REPORTS
TECHNICAL GUIDANCE
DECISION TOOLS

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