



An Update on the National Aquaculture Strategic Action Plan Initiative (NASAPI)

Innovation & Emerging Technologies

Aquaculture Innovation Workshop
Campbell River, BC
Sept. 26 – 27, 2011





Outline

1. NASAPI : The overall framework
2. Aquaculture emerging technology priorities in Canada
3. DFO's investments in Recirculation Aquaculture Systems & the Aquaculture Innovation and Market Access Program (AIMAP)
4. Update on First Nations and Aboriginal initiatives

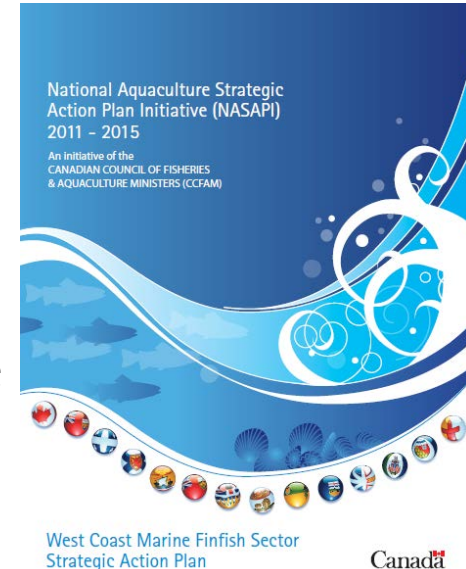


1. NASAPI : The Overall Framework



PURPOSE OF NASAPI

- ❖ Under the leadership of the Canadian Council of Fisheries & Aquaculture Ministers (CCFAM), NASAPI is a national, collaborative exercise to outline a road map for economically, environmentally and socially sustainable aquaculture development throughout Canada





What is NASAPI?

- ❖ Overarching Document
 - Framework encompassing purpose, vision, objectives and guiding principles for NASAPI
- ❖ 5-Year Strategic Action Plans to help each sub-sector of the industry reach its full potential
 - East Coast Marine Finfish West Coast Marine Finfish
 - East Coast Shellfish West Coast Shellfish
 - Freshwater
- ❖ A process bringing together federal, provincial and territorial government mandates, along with FN/Aboriginal groups, industry, academia and ENGOs to develop the first ever national aquaculture plan for Canada



Objectives of NASAPI

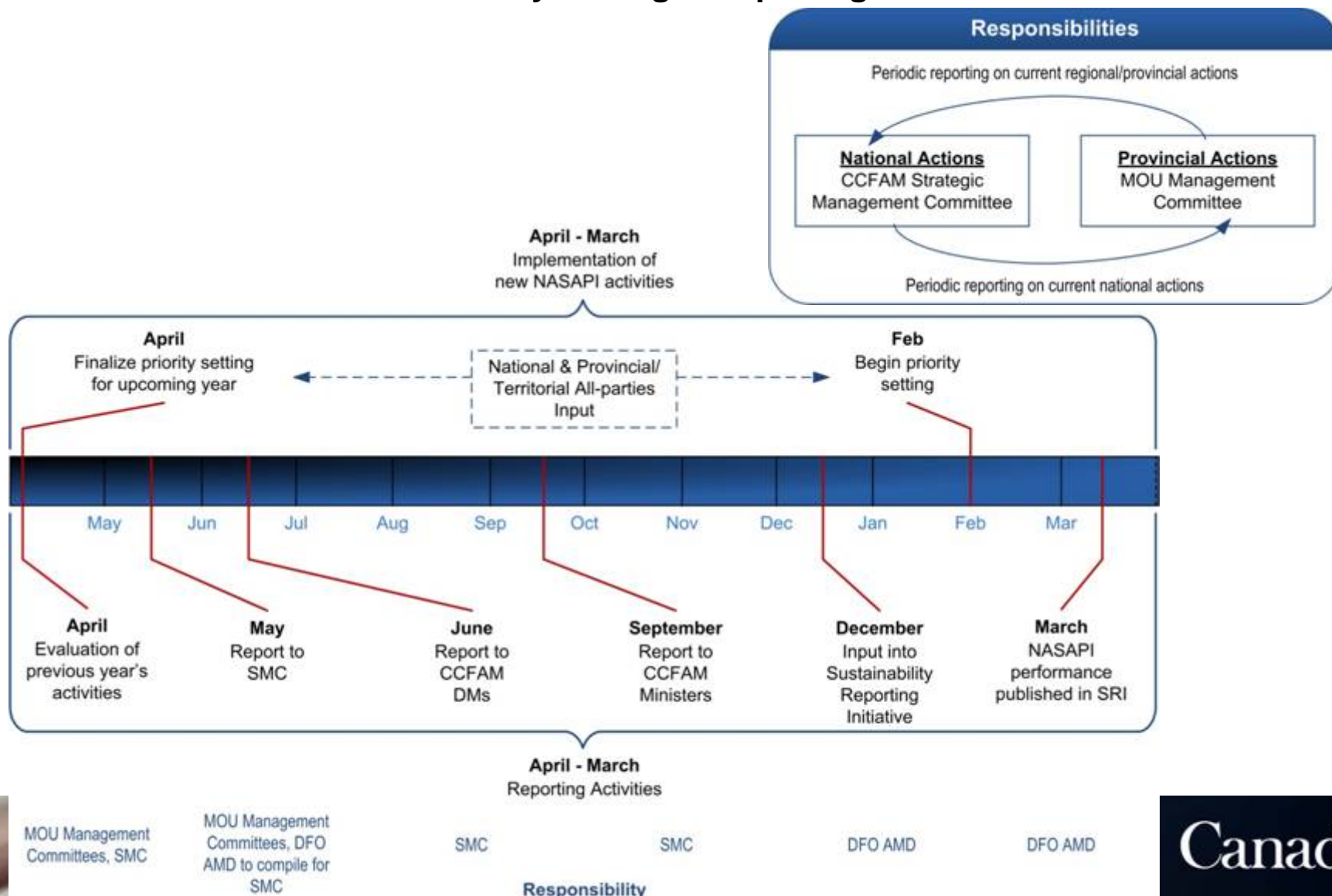
- ❖ To modernize industry and government management of the sector in a manner that is more responsible, sustainable and transparent
- ❖ To generate enhanced public and investor confidence in aquaculture





National Aquaculture Strategic Action Plan Initiative

Priority Setting & Reporting Process





2. Aquaculture Emerging Technology Priorities in Canada



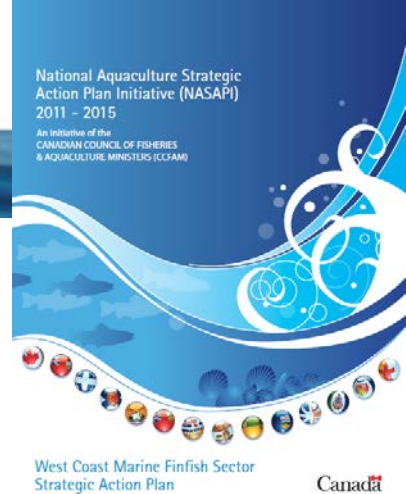
NASAPI - Emerging Technologies

- ❖ **ET-1** Improve the quality and traits of broodstocks for Atlantic salmon, steelhead and rainbow trout aquaculture
 - Selection of genetic traits to enhance productivity and sustainability
- ❖ **ET-2** Quantify the environmental footprint, (e.g. carbon footprint, water quality impacts, sediments, chemicals, antibiotics, pesticides, nutrient loading, escapes, disease, etc.) of aquaculture subsectors and identify areas where investment into green technologies is most pertinent



ET-2 Quantify the environmental footprint

- ❖ Environmental concerns associated with aquaculture are diverse and range:
 - from highly localized ecological impacts associated with farm sites and practices
 - to regional and longer temporal scale impacts
 - through to contributions to global-scale concerns
- ❖ A number of methodologies exist or are currently under development. E.g.:
 - Life Cycle Assessment (LCA)
 - Environmental Impact Assessment (EIA)
 - Strategic Environmental Assessment (SEA)
 - Ecological Footprint Analysis
 - Global Aquaculture Performance Index (GAPI)





ET-2 Quantify the environmental footprint

- ❖ Even where well established and broadly accepted, these methods are generally limited to:
 - quantifying single environmental impacts and do not allow for the integration and assessment of multiple concerns simultaneously;
 - part of the full suite of potential/perceived environmental effects that may characterize the environmental performance of aquaculture
 - do not allow for the integration of local and global impacts.
- ❖ Therefore, under NASAPI, the intention is to outline and examine the possibility of a comprehensive approach that would encompass all aspects of environmental impacts for aquaculture (closed containment, RAS, net pens and other technologies)





ET-2 Quantify the environmental footprint

❖ The first step was to commission an expert review (Tyedmers & Ayer) of existing methodologies to inform future planning. Objectives:

1. Identify and describe existing and emerging integrative analytical methods or frameworks.
2. Summarize the specific areas of environmental impact associated with aquaculture where gaps exist in the reviewed methodologies and provide an assessment of the potential for these gaps to be overcome in the short-term or long-term due to emerging research or data availability.



ET-2 Quantify the environmental footprint

Preliminary Conclusions:

- A continuum exists amongst the frameworks examined, and while LCA might be best for core methodological work, the use of supporting/complimentary frameworks should be considered to meet a wide range of needs
- LCA shows the greatest potential to form the basis for an integrative framework. Considers:
 - Supply chain impacts
 - Continued improvement in addressing proximate ecological impacts near the farm
 - Flexible to changes in production & geographic scope
- However, LCA is deficient in assessing localized impacts from farm level activities:
 - Escapes
 - Fish wastes
 - Disease or parasite exchange
- Might consider a hybrid approach:
 - Principles of LCA + information on local ecological conditions

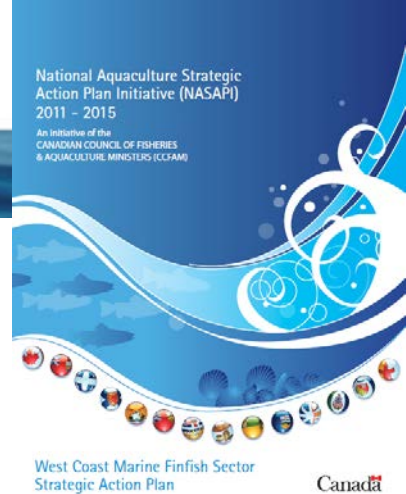




ET-2 Quantify the environmental footprint

Next Steps

- ❖ Internal review and discussion
 - Need for Departmental (and government in general) consistency and application
- ❖ Outline a comprehensive approach/methodology that would encompass all aspects of aquaculture environmental impacts
 - Longer term approach
 - Involvement of multiple stakeholders and contributors
 - GoC, provinces/territories, industry, academia, ENGOs





NASAPI - Emerging Technologies

- ❖ **ET-3** Invest in R&D to advance commercial closed-containment aquaculture (CCA) systems and recirculating aquaculture systems (RAS)
 - Identify opportunities for commercial-scale evaluation
 - Identify principal areas of risk and appropriate mitigation strategies
 - Promote benchmarking

- ❖ **ET-4/5** Invest in R&D to advance cage (ET4) and suspension (ET5) aquaculture in high-energy/off-shore areas
 - Identify opportunities for commercial-scale evaluation of new technologies and equipment



NASAPI - Emerging Technologies

❖ ET-6 Advance Integrated Multi-Trophic Aquaculture (IMTA)

- Conduct a comprehensive assessment of markets, biophysical resources, production technologies and financial viability for cultivation of marine plants
- Evaluate overall environmental performance of IMTA
- Conduct economic modelling with various primary (e.g. finfish), secondary (e.g. shellfish) and tertiary (e.g. marine plants) species

❖ ET-7 Improve market access for shellfish producers

- Enhance shellfish depuration
- Improve access to relaying and depuration facilities



NASAPI - Emerging Technologies

❖ ET-8 Improve mechanization for shellfish handling and harvesting

- Enhance mechanical handling (i.e. grading, resetting stock post-overwintering, etc.), harvesting and processing technologies

❖ ET-9 Improve productivity and efficiency through enhanced net pen technologies and practices

- Develop improved technologies to manage toxic algae blooms
- Develop efficient means to oxygenate waters in net pens
- Enhance technologies for biofouling control and predator control
- Develop methods to improve mort utilization / disposal



3. DFO's investments in Recirculation Aquaculture Systems & the Aquaculture Innovation and Market Access Program (AIMAP)



AIMAP BACKGROUND & OBJECTIVES

Background

- Grants & contribution program
 - 5 years
 - \$4.5 M/year - innovation
 - \$200,000/year - market access
- Industry focused projects with implementable results within 3 years max. (ideally 1 year)
 - Applied research (industry-driven)
 - Development
 - Early commercialization
 - Early industry adoption of innovative technology or results
- Focus on the development / pre-commercialization end of the RDC spectrum



AIMAP BACKGROUND & OBJECTIVE

Objective

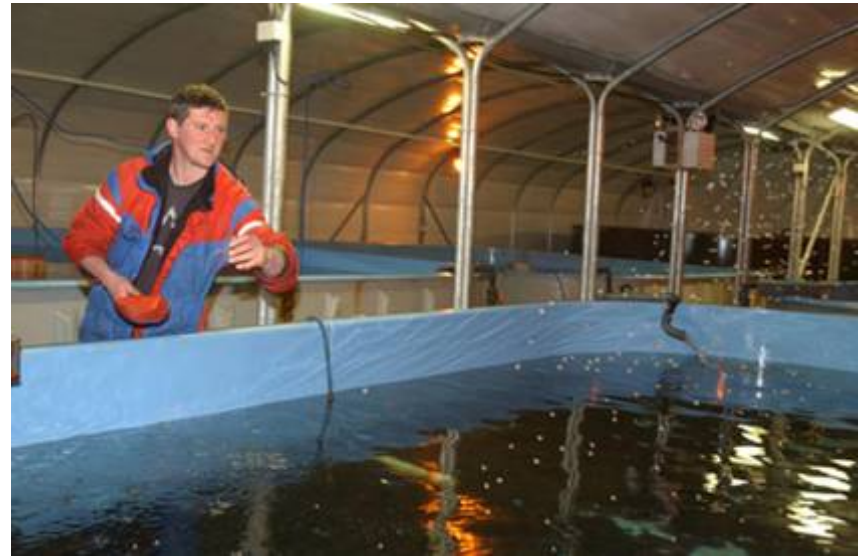
- To allow aquaculture industry proponents to develop and adopt new, innovative technologies & products to improve competitiveness in terms of both environmental performance and global market share





AIMAP

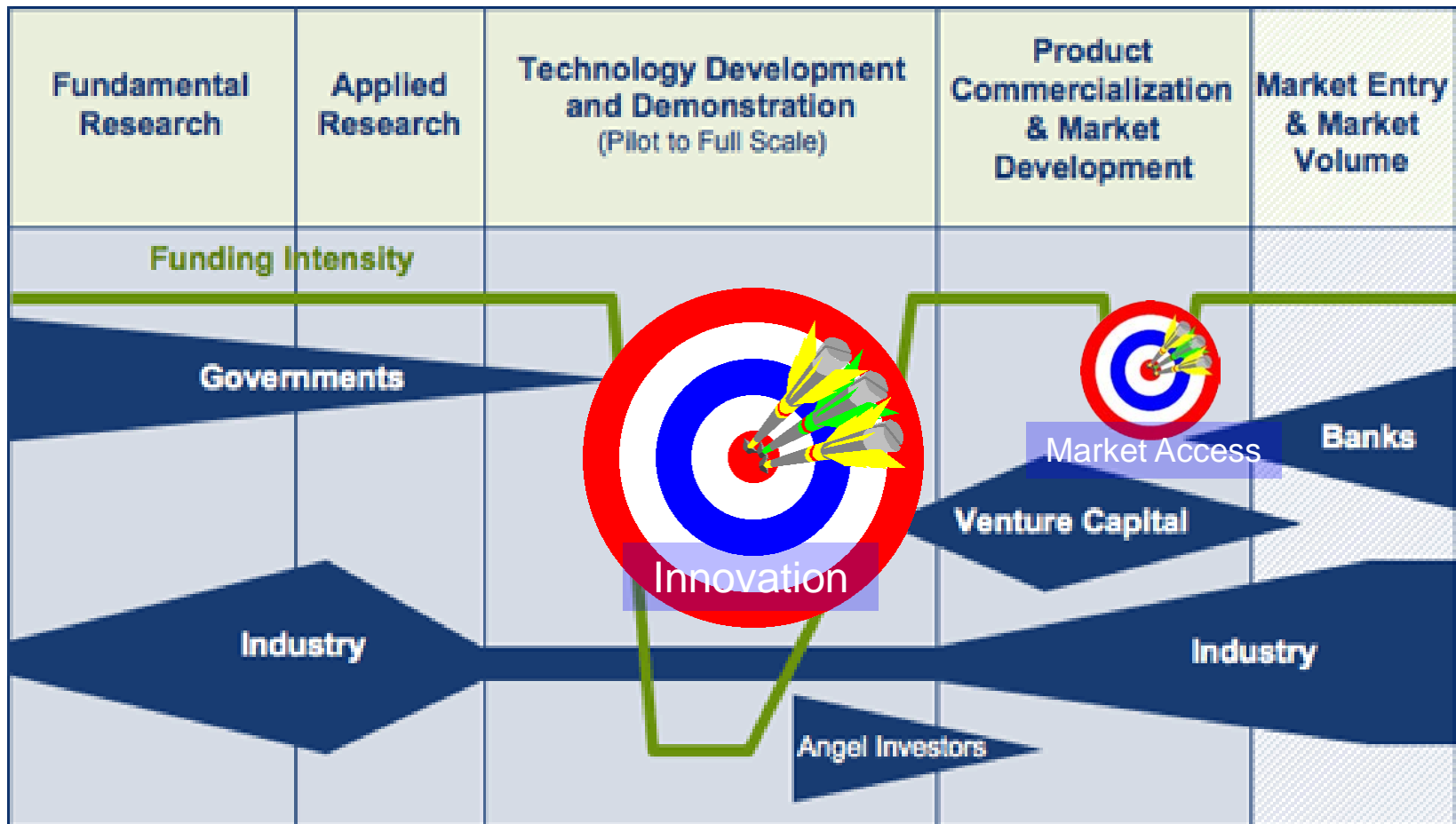
- Focuses on the development and pre-commercialization end of the innovation chain as depicted in the next slide





AIMAP BACKGROUND & OBJECTIVES

The Innovation “Chain”





AIMAP BACKGROUND & OBJECTIVES

Eligible recipients of contributions from AIMAP include:

- Not-for-profit organizations, such as aquaculture industry and professional associations or consortia of producers
- Aboriginal organizations or communities involved in aquaculture
- Non-governmental organizations (e.g., ENGOs) preferably associated with an aquaculture industry partner
- Private individuals or companies associated with aquaculture production or development
- Processors of aquaculture product
- Education or research institutes affiliated with any of the above

Aquaculture is defined as the farming of fish, shellfish and aquatic plants in fresh or salt water.



Priorities

Sustainable Production

- Improving production systems and predator control
- Increasing operational efficiency
- Value-added production (primary product through to waste/by-products)
- Improving health management tools and biosecurity
- Improved quality (all-female/triploid stocks) and supply (reduced reliance on imported eggs) of progeny
- Invasive species control or mitigation
- Feed (or ingredient) development resulting in increased performance



Priorities

Species Diversification

East Coast	West Coast
<ul style="list-style-type: none">•Atlantic Halibut•Atlantic Cod•Scallops (Bay & Giant)•Soft-shell Clams	<ul style="list-style-type: none">•Sablefish (= Black Cod)•Geoducks•Mussels•Scallops
Freshwater	
<ul style="list-style-type: none">•Arctic Charr•Sturgeon	<ul style="list-style-type: none">•Walleye•Perch



Priorities

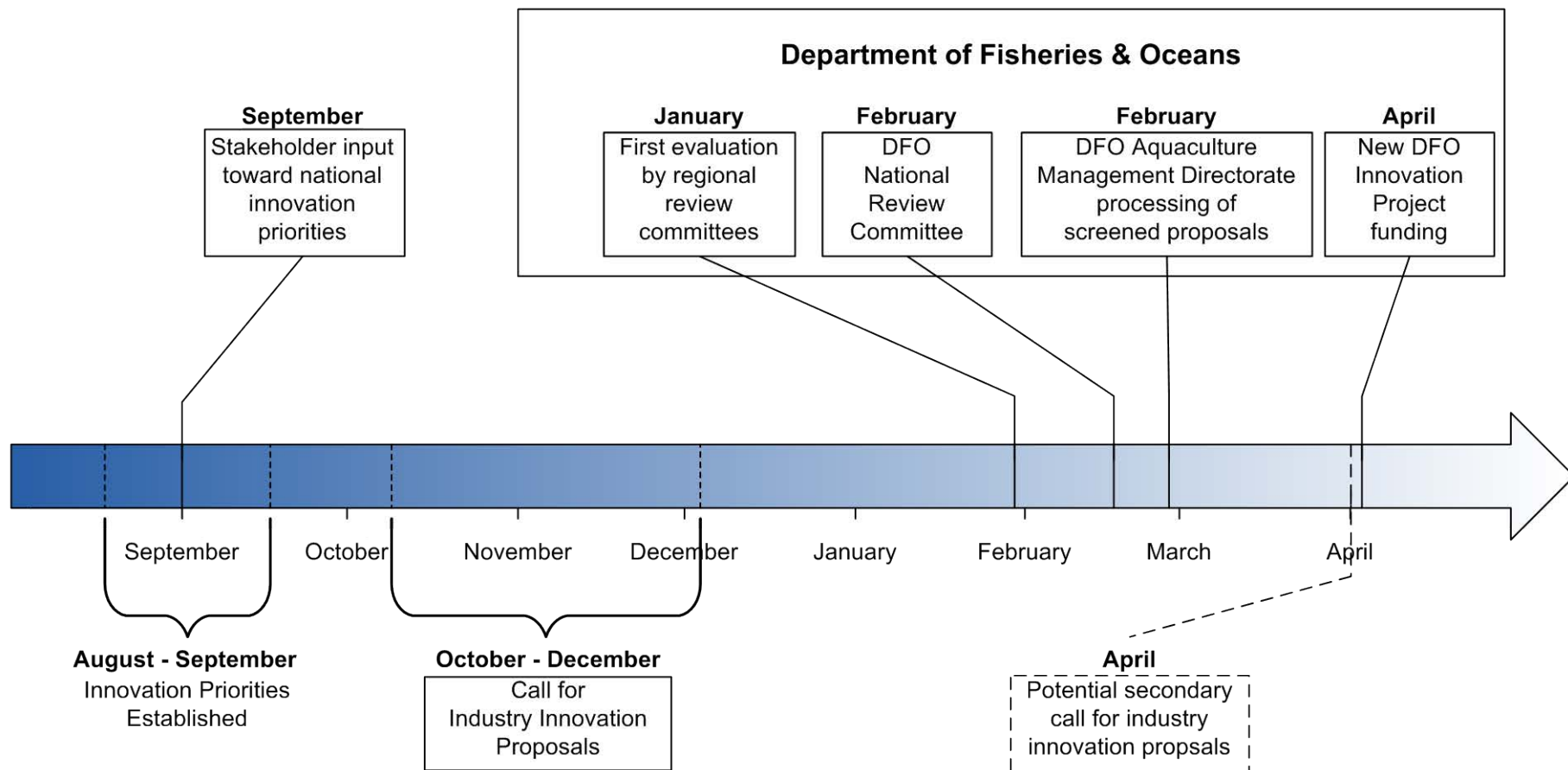
Green Technology

New technologies or practices focused on:

- Increasing environmental performance
- Alternate energy use or improving energy efficiency
- Waste control, reduction or mitigation
- Discharge or effluent treatment
- Water conservation
- Feed related strategies resulting in increased environmental performance



AIMAP BACKGROUND & OBJECTIVES





AIMAP OVERVIEW

AIMAP Overview (08/09 – 11/12)

	Innovation	Market Access
Requests	239	12
Total Project Value	>\$200M	>\$3.5M
Total Ask	>\$57M	\$2.5M
Funded	88	10
Total Project Value	\$56.3M	\$1.6M
AIMAP Contribution	\$14.1M ¹	\$957k
Leverage	Program has achieved leverage of 3-4 times the investment by DFO	

¹ Includes multi-year commitments



FY 2012-13

Establishing Innovation Priorities

- Prioritization exercise is an important and valuable tool to assist in the selection process.
- Innovation priorities are developed in consultation with stakeholders:
 - Provinces & Territories,
 - Industry & Others (eg. ENGOs)

Public disclosure of DFO priorities through launch of AIMAP call for proposals



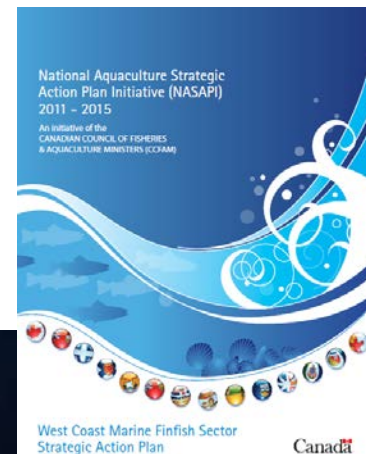
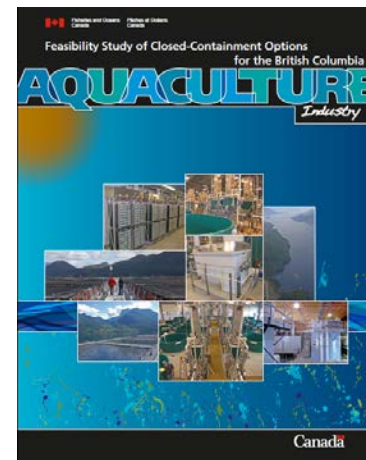
AIMAP CCA & RAS Initiatives

- ❖ Projects approved in 2010/11:
 - 'Namgis Land-Based Atlantic Salmon Recirculating Aquaculture System Pilot Project ('Namgis First Nation)
 - Land-based Atlantic Salmon Grow-out Employing Recirculating Aquaculture System (RAS) Technology - Pilot Project (Marine Harvest)
 - Recently withdrawn at request of Recipient
- ❖ Projects supported in earlier rounds of funding:
 - Canadian Model Aqua-Farm, Warren MB
 - Constructed in 2010
 - Intensive monitoring program (2011-2013)
 - Agri-Marine - Development of an Industrial Flow Centrifuge to Capture Finfish Effluent
 - Target Marine – various sturgeon projects involving RAS
 - CanAqua – land-based Atlantic halibut production



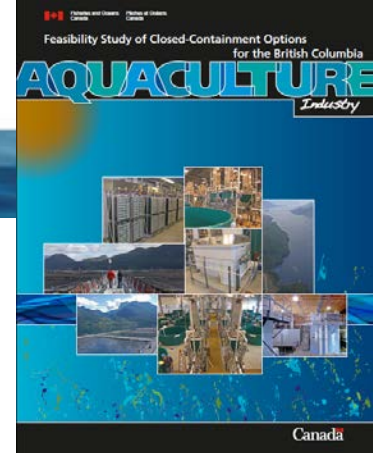
Closed Containment Aquaculture

- ❖ Canadian Science Advisory Secretariat (CSAS)
 - *Evaluation of Closed-Containment Technologies for Saltwater Salmon Aquaculture (2008 – 2010)*
- ❖ DFO Aquaculture Management Directorate
 - *Feasibility Study of Closed-Containment Options for the British Columbia Aquaculture Industry (2010)*
- ❖ NASAPI Action Item ET-3: Closed-Containment and Recirculating Aquaculture
 - Support for pilot-scale project(s) to validate technologies and practices (2011-2015)





CCA Financial Feasibility Study



- ❖ The results of this analysis have shown that while both technologies are profitable on a pro-forma basis, with returns significantly higher for net pen, RAS technologies are:
 - Considerably more sensitive to market forces beyond the control of the operator;
 - Have the ability to become non-profitable within a range of variability that has been experienced by the Canadian salmon aquaculture industry in the past.
- ❖ In summary, RAS shows some economic potential but with a high level of uncertainty for all major assumptions and therefore a high risk associated to it.
 - Potential has to be assessed and all assumptions verified in real-life scenario (pilot scale) before any final policy decision/direction.



4. Update on First Nations and Aboriginal Activities



Increasing Aboriginal Participation in Aquaculture

- Currently at inception stage
- Stems directly from NASAPI and builds on efforts within DFO and other federal departments, along with provincial/territorial governments
- Focus on enabling economic prosperity for those First Nations and Aboriginal communities interested in aquaculture



Increasing Aboriginal Participation in Aquaculture

Objective:

- Identify and develop the networks, partnerships and processes within all stakeholders (government, FN/Aboriginal groups, industry, etc.)
 - Identify realistic business opportunities, along with issues that hinder them
- Make the most effective and efficient use of existing government resources
- Following the Federal Framework for Aboriginal Economic Development
 - Whole-of-government approach



THANK YOU

(and over to my Pacific colleague for an update on
the *Pacific Aquaculture Regulation*)