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 PLANS

GOVERNANCE
- Environmental Management
- Aquaculture Management
- Introductions and Transfers of Aquatic Organisms
- Navigable Waters Protection Act
- On-site Inspection
- Access to Wild Aquatic Resources for Aquaculture Purposes
- Canadian Shellfish Sanitation Program
- Other Regulatory & Governance Issues

SOCIAL LICENCE & REPORTING
- Public Engagement and Communication
- Transparent Information-sharing Systems
- Aquaculture Sustainability Reporting
- Resource Mapping
- Aboriginal Engagement in Aquaculture

PRODUCTIVITY & COMPETITIVENESS
- Fish/Shellfish Health Management
- Aquatic Invasive Species
- Emerging Technologies
- Aquatic Feeds
- Alternative Species Development
- Risk Management & Access to Financing
- Infrastructure
- Marketing & Certification
- Labour & Skills Development

MAIN AREAS FOR ACTION

Implementation
At Regional / Provincial / Territorial level through MOU / other mechanisms

CCFAM
Federal, Provincial & Territorial Governments

Industry

First Nations & Aboriginal Groups

Performance Monitoring
MOU Management Committees
Sustainability Reporting

Other Stakeholders
National Aquaculture Strategic Action Plan Initiative

Priority Setting & Reporting Process

Responsibilities
- Periodic reporting on current regional/provincial actions
- Periodic reporting on current national actions

National Actions
- CCFAM Strategic Management Committee

Provincial Actions
- MOU Management Committee

Responsibility
- MOU Management Committees, DFO AMD to compile for SMC

April - March
- Implementation of new NASAPI activities

April
- Finalize priority setting for upcoming year

May
- Evaluation of previous year’s activities
- Report to SMC

June
- Report to CCFAM DMs

September
- Report to CCFAM Ministers

December
- Input into Sustainability Reporting Initiative

March
- NASAPI performance published in SRI
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)
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
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
**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)
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
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
The Innovation “Chain”

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Funding Intensity</td>
<td>Governments</td>
<td>Innovation</td>
<td>Market Access</td>
<td>Banks</td>
</tr>
<tr>
<td>Industry</td>
<td>Venture Capital</td>
<td></td>
<td></td>
<td>Angel Investors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
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
# Species Diversification

<table>
<thead>
<tr>
<th>East Coast</th>
<th>West Coast</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Atlantic Halibut</td>
<td>• Sablefish (= Black Cod)</td>
</tr>
<tr>
<td>• Atlantic Cod</td>
<td>• Geoducks</td>
</tr>
<tr>
<td>• Scallops (Bay &amp; Giant)</td>
<td>• Mussels</td>
</tr>
<tr>
<td>• Soft-shell Clams</td>
<td>• Scallops</td>
</tr>
</tbody>
</table>

**Freshwater**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Arctic Charr</td>
<td>• Walleye</td>
</tr>
<tr>
<td>• Sturgeon</td>
<td>• Perch</td>
</tr>
</tbody>
</table>
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

Department of Fisheries & Oceans

- **September**: Stakeholder input toward national innovation priorities
- **October - December**: Call for Industry Innovation Proposals
- **January**: First evaluation by regional review committees
- **February**: DFO National Review Committee
- **February**: DFO Aquaculture Management Directorate processing of screened proposals
- **April**: New DFO Innovation Project funding

**August - September**: Innovation Priorities Established

**April**: Potential secondary call for industry innovation proposals
**AIMAP Overview (08/09 – 11/12)**

<table>
<thead>
<tr>
<th></th>
<th>Innovation</th>
<th>Market Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requests</td>
<td>239</td>
<td>12</td>
</tr>
<tr>
<td>Total Project Value</td>
<td>&gt;$200M</td>
<td>&gt;$3.5M</td>
</tr>
<tr>
<td>Total Ask</td>
<td>&gt;$57M</td>
<td>$2.5M</td>
</tr>
<tr>
<td>Funded</td>
<td>88</td>
<td>10</td>
</tr>
<tr>
<td>Total Project Value</td>
<td>$56.3M</td>
<td>$1.6M</td>
</tr>
<tr>
<td>AIMAP Contribution</td>
<td>$14.1M&lt;sup&gt;1&lt;/sup&gt;</td>
<td>$957k</td>
</tr>
<tr>
<td>Leverage</td>
<td>Program has achieved leverage of 3-4 times the investment by DFO</td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> Includes multi-year commitments
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)

- DFO Aquaculture Management Directorate

- NASAPI Action Item ET-3: Closed-Containment and Recirculating Aquaculture
  - Support for pilot-scale project(s) to validate technologies and practices (2011-2015)
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
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)