LIVING LABORATORIES INITIATIVE

Living Lab - Atlantic Project Overview

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What is a Living Laboratory?

A Living Laboratory is an integrated **approach to agricultural innovation** that bring farmers, scientists and other **partners** together to co-develop, test and monitor BMPs and new technologies in a **real life context**.

The result will be more practical technologies and sustainable farming practices **adopted more quickly** by Canadian farmers.

Planning/Targeting

Validate and refine the cycle of innovation (priorities, outcomes, etc)

Co-design

Identify the needs/outcomes – anticipate possible impediments

Exploration/Experimentation

Acquire new data, conduct experiments, develop new knowledge

Evaluation

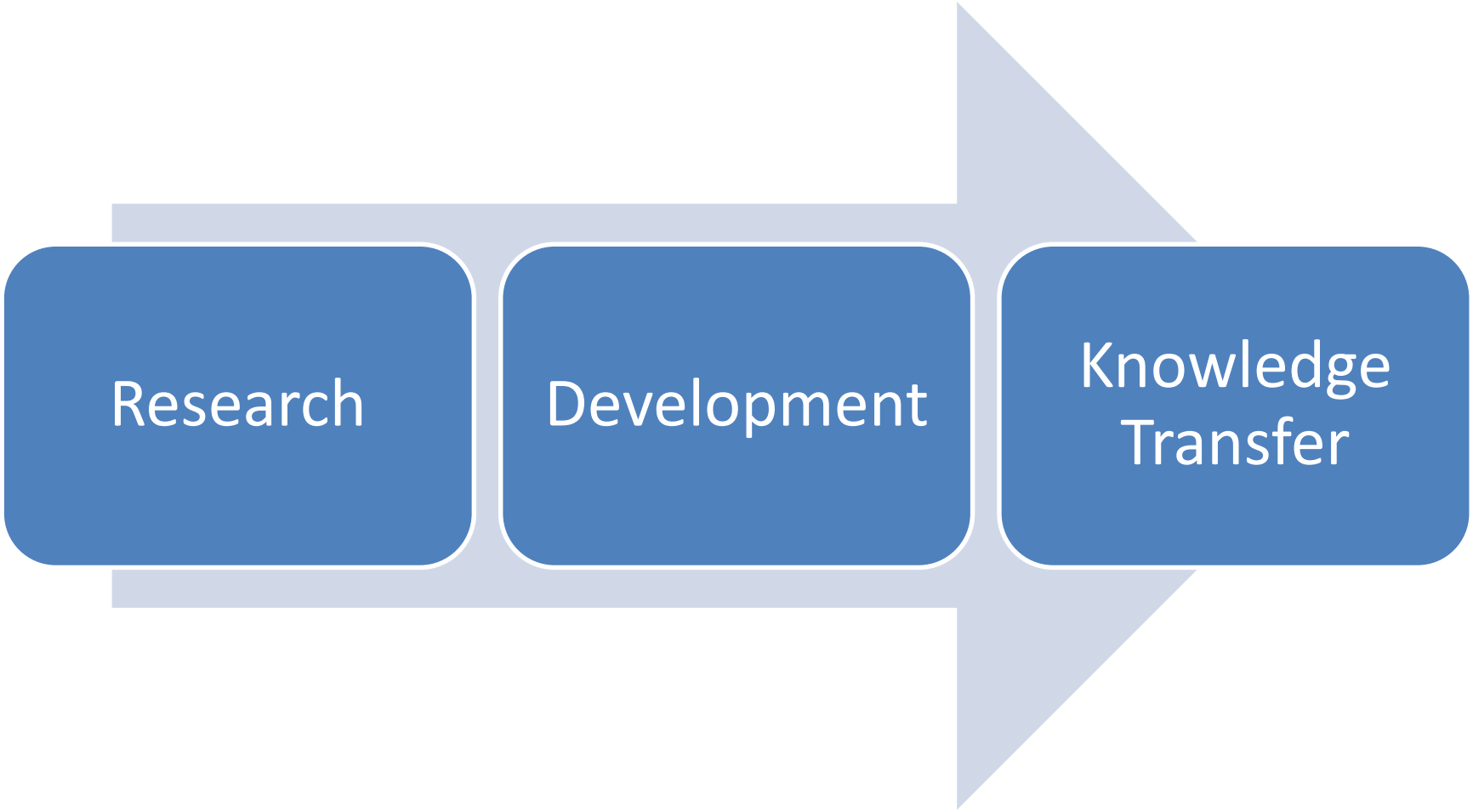
Evaluate new practice or technology, and adjust based on producer input

Adoption

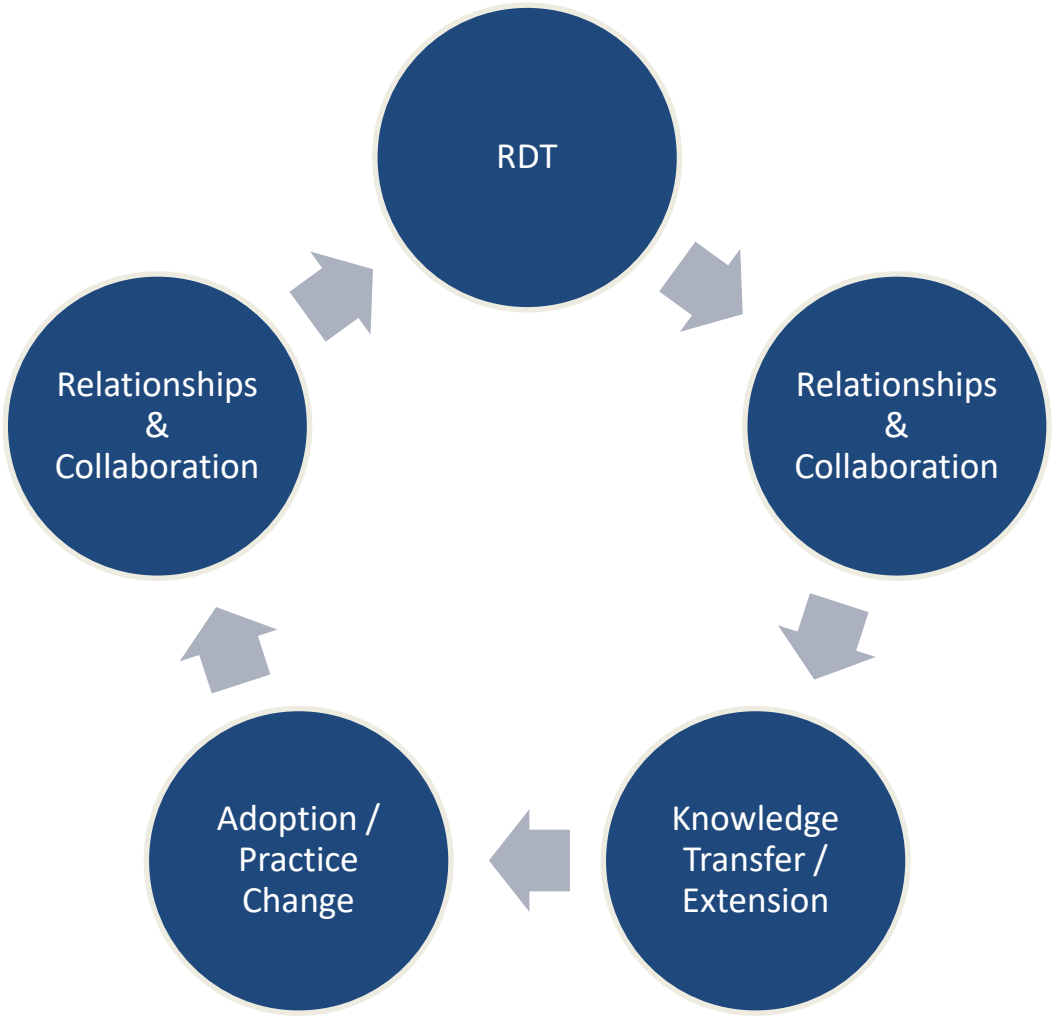
Take stock of the experiments and the cycle of innovation

(Adapted from L'Acadie Lab)

Traditional Innovation Approach



Evolution of KTT

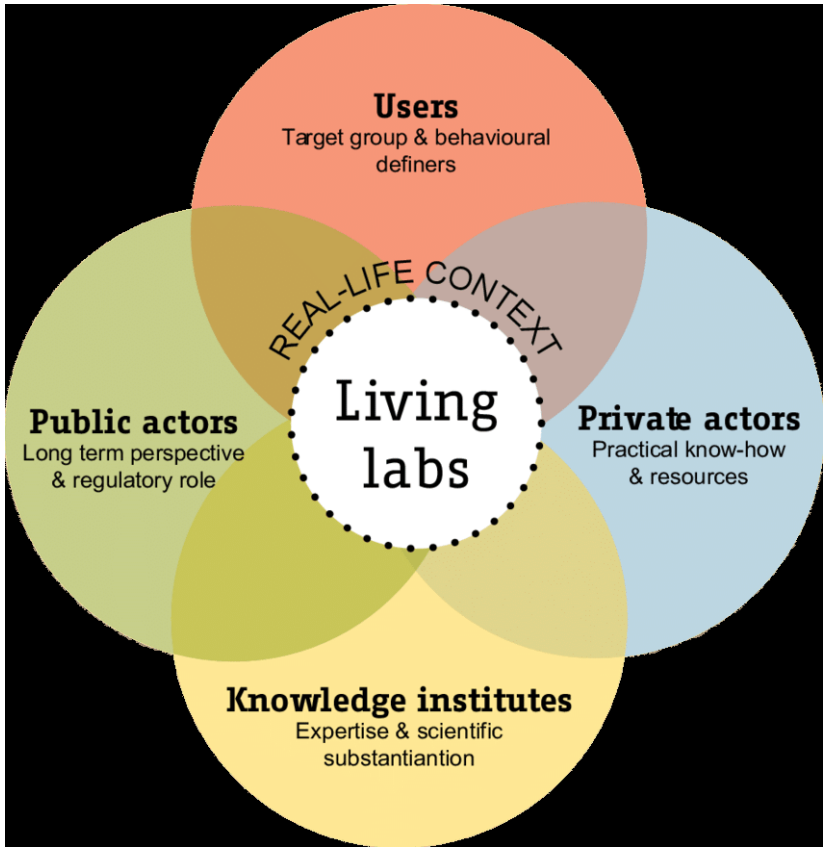


Something was still missing…..

User Centred Approach

A New Approach for Innovation

- **Living Labs**
  - co-develop the project
  - co-collect the measurements
  - co-create the science information and conclusions
  - End-goal: earlier adoption of BMPs and demonstrated success by producers to their peers



Steen and van Bueren, 2017

Co-Development: Key Points

- It is a regular and required process in an ongoing cycle of innovation.
- It includes organized events where all participants are focused specifically on evaluating practices or technologies and contributing ideas toward their improvement.
- It is user-centred, but is also collaborative: users and partners from various disciplines and backgrounds all contribute their unique perspectives toward a common goal.

Co-Development

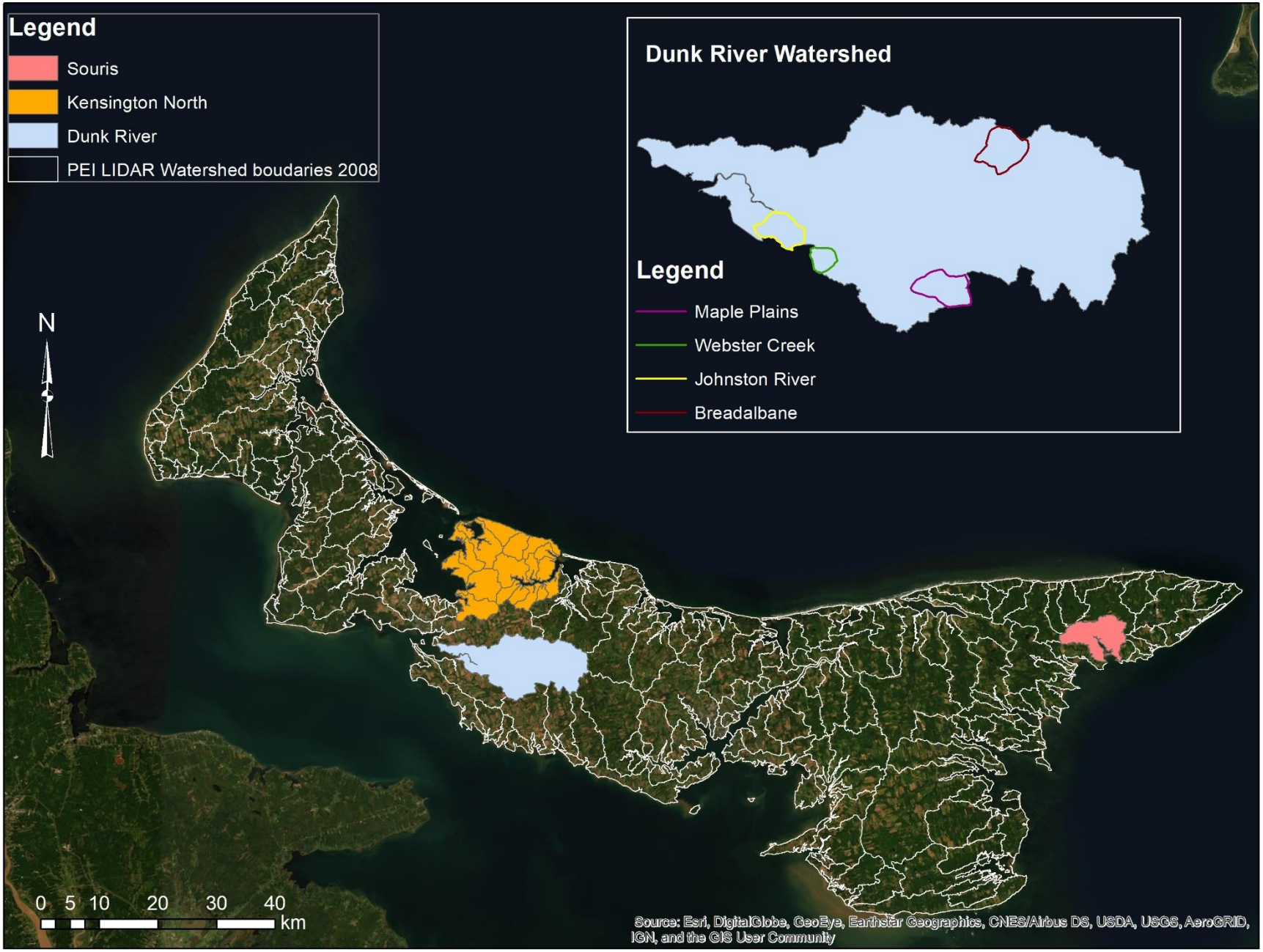
- It complements informal or unplanned moments of reflection and conversation about potential solutions.
- It must be captured in a way that will enable decisions to be made.

Overview of the Atlantic Canada Proposals

	Internal Proposal	External Proposal
Title	Using a living laboratory approach to develop and transfer innovative soil and water quality best management practices in Prince Edward Island	Demonstrating best management practices to enhance soil health, water quality and crop productivity
Agri-env. Priorities	• Soil conservation • Water quality	
Leads	Dr. Yefang Jiang and Dr. Judith Nyiraneza	East Prince Agri-Environment Association
Participants /Partnerships	• 21 AAFC STB activity leads supported by professionals, technicians and students • **Other AAFC units:** AAFC Pest Management Centre, Strategic and Policy Branch • **Other governments:** Canadian Food Inspection Agency, Environment and Climate Change Canada's Science and Technology Branch, Department of Fisheries and Ocean • East Prince Agri-Environment Association and partners	• **Producer Group:** Potato Producers; PEI Potato Board • **NGOs:** Kensington North Watersheds Association; Souris and Area Branch of the Federation of Wildlife; PEI Watersheds Alliance; Ducks Unlimited Canada • **Universities:** Dalhousie University – Faculty of Agriculture; University of New Brunswick and PEI; St. Francis Xavier University; • **Industry:** Genesis Crop Systems Inc. • **Provincial Governments:** PEI Department of Communities, Land and Environment; PEI Department of Agriculture and Fisheries
Innovation Hub	• AAFC Harrington Research Farm (Plot scale)	
Real life experimental setup	• Kensington North Watershed (Field scale) • McInnis Pond site (Paired-field studies) • Dunk River Watershed: Maple Plains and Breadalbane sub-watersheds (Paired-watershed studies)	
Funding	• FY1: 778K • FY2: 876K • FY3: 881K • FY4: 881K	• FY1: 527K • FY2: 568K • FY3: 649K • FY4: 479K

Overview of the Atlantic Canada Proposals

Internal Proposal	External Proposal
Main Objectives	
1- **Demonstrate BMPs (cover crops, nursing crops, reduced tillage, crop rotation, etc) to enhance soil health** and crop productivity through scientific evaluation at plot-, field- and watershed-scales. Basic soil properties, soil quality and nutrient cycling parameters will be collected and evaluated. 2- **Evaluate BMPs to reduce nutrients and pesticides loading** through: 1) paired-field and paired sub-watershed demonstrations, 2) assessment of nutrient and pesticide dynamics in multiple stressor environmental frameworks; 3) decision support tool for N recommendation; 4) linking modelled and empirical freshwater nutrient loads to estuarine eutrophication dynamics **3- Socio-economic analysis on BMPs (focus on pest management reduction BMPs)** 4- **Knowledge and technology transfer** of BMPs through a myriad of activities (field days, social media, town halls, outreach events, annual workshops, etc.)	1- **Implementation and evaluation of BMPs at the field and watershed scales** including **cover and nursing crops, soil-building crop rotations, organic soil amendment, nitrogen use and irrigation efficiencies (varieties, fertilizers), and reduced tillage practices.** 2- Paired-field and paired-watershed implementation of BMPs (cover crops, reduced tillage, wastewater treatment technologies, reduced nitrogen applications, etc) to reduce nitrate leaching and loading; hydrological modelling to inform the source and quantity of nitrate loading to surface water and groundwater **3-Socio-economic analysis** to measure on-farm profitability, off-farm social benefits and barriers and incentives for BMP adoption 4- **Knowledge and technology transfer** of BMPs through a myriad of activities (field days, social media, town halls, outreach events, annual workshops, etc.)
Living Lab Approach	
• **User-centered innovation:** BMPs identified by producer group, and feedback loops with producers throughout project via KTT activities (town halls, annual workshops). • **Partnerships:** Internal collaborations with CFIA/ECCC/DFO and external partners, and external collaborations with producer and watershed groups, industry, universities, provinces and external partners. Indigenous linkages will be explored. • **Real-life experiments:** Commercial fields and sub-watersheds.	


Legend
Souris
Kensington North
Dunk River
PEI LIDAR Watershed boudaries 2008
Dunk River Watershed
Legend
Maple Plains
Webster Creek
Johnston River
Breadalbane
N
0 5 10 20 30 40
km
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Living Lab (Atlantic)

- **Primary Objectives**
  - test and demonstrate BMPs to enhance soil health and crop productivity
    - Cover crops, tillage, supplemental irrigation, soil mapping
  - test and demonstrate BMPs to reduce nutrients, and pesticides loadings
    - Modelling, precision agriculture, GHG, N decision support tool
  - perform socio-economic assessment of BMPs
    - Farm level economics and barriers/incentives to adoption
  - transfer knowledge and technology of BMP
    - On farm demonstrations
    - Promotion of information to producer groups in other Atlantic Provinces

BMP1: Use of Fall Seeded Cover Crops following Primary Tillage

Lead Agency- PEI Potato Board

BMP 1: Cover Crops Before Potatoes

- **Objective(s):**
  - Show the benefits of fall cover crop following tillage for erosion control, soil health, soil organic matter, and yield in potatoes the following year
- **Activities and Deliverables:**

Selection of fields (up to 8) and treatments
Soil sampling for soil chemical, soil N supply, Verticillium/nematodes, soil health characteristics, compaction
Record percentage ground cover
Measure erosion potential (pins, splash pans)
Measure impact on yield/quality of potatoes

- **Linkages to other internal/external activities:**
  -

BMP2: Use of Fall Seeded Cover Crops following Potato Production

Lead Agency – PEI Potato Board

BMP 2: Cover Crops after Potatoes

- **Objective(s):**
  - Show the benefits of fall cover crop following potato harvest to reduce soil erosion, intercept soil nitrates, improve soil health.
- **Activities and Deliverables:**

Selection of fields (up to 8) and treatments
Soil sampling for soil chemical, soil N supply, soil health characteristics, soil nitrate at 3 depths
Record percentage ground cover
Measure erosion potential (pins, splash pans)

- **Linkages to other internal/external activities:**
  - Supporting Activity #2

BMP3: Use of Full-Season Soil-Building Rotation Crops for Building Soil OM

Lead Agency – PEI Potato Board

BMP 3: Soil-Building Crops

- **Objective(s):**
  - Show the benefits of full-season, non-harvested rotation crops at improving soil organic matter, soil structure, and disease/pest pressure
- **Activities and Deliverables:**

Selection of fields (up to 10) and treatments
Soil sampling for soil chemical, soil N supply, soil health characteristics, Verticillium/nematodes, compaction
Recording above ground biomass
Yield/quality of potatoes the following year

- **Linkages to other internal/external activities:**
  - Supporting Activity #2

BMP 4- Nurse Cropping Demonstration Trials within Potato and Corn Production Systems

Lead Agency – PEI Dept of Agriculture & Land

BMP-5 Demonstrating Potato Productivity and Nitrogen use efficiency as affected by Supplemental Irrigation

Lead Agency – PEI Dept of Agriculture & Land

BMP#6 - Effect of irrigation on yield, quality and economic value of existing and emerging processing potato varieties

Lead Agency – Genesis Crop Systems

BMP#7 - Reducing nitrogen loss through use of slow release fertilizer products

Lead Agency – Genesis Crop Systems

Using constructed wetland and vegetated drain ditches* to improve water quality (External BMP 8)

Lead Agency – PEI Watershed Alliance

Questions???