

PKC-CHARS and NASA ABoVE Working Together for Common Goals

ABoVE Science Team – 1st Meeting
Minneapolis, MN - September 28th, 2015



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POLAR Governance & History

“Our government will build a world-class arctic research station that will be on the cutting edge of arctic issues, including environmental science and resource development.

This station will be built by Canadians, in Canada's Arctic, and it will be there to serve the world.”

Speech from the Throne, October 2007

- On August 23, 2012, the Prime Minister of Canada announced:
 - \$142.4 million over six years for the construction, equipment, and fit-up of CHARS
 - \$46.2 million over six years for the phase-in of the CHARS S&T Program
 - Starting in 2018-19, \$26.5 million per year for the on-going S&T program and operation of the station

- August 23, 2014, Prime Minister Stephen Harper participated in a groundbreaking ceremony to launch the construction phase of CHARS

- October 23, 2014, the *Canadian High Arctic Research Station Act* was introduced in the House of Commons to establish a new federal research organization

- June 1, 2015, coming into force of the CHARS Act

- July 28, 2015, Mr. Richard Boudreault was appointed Chair of the Board; and Dr. David J. Scott appointed first President of POLAR.

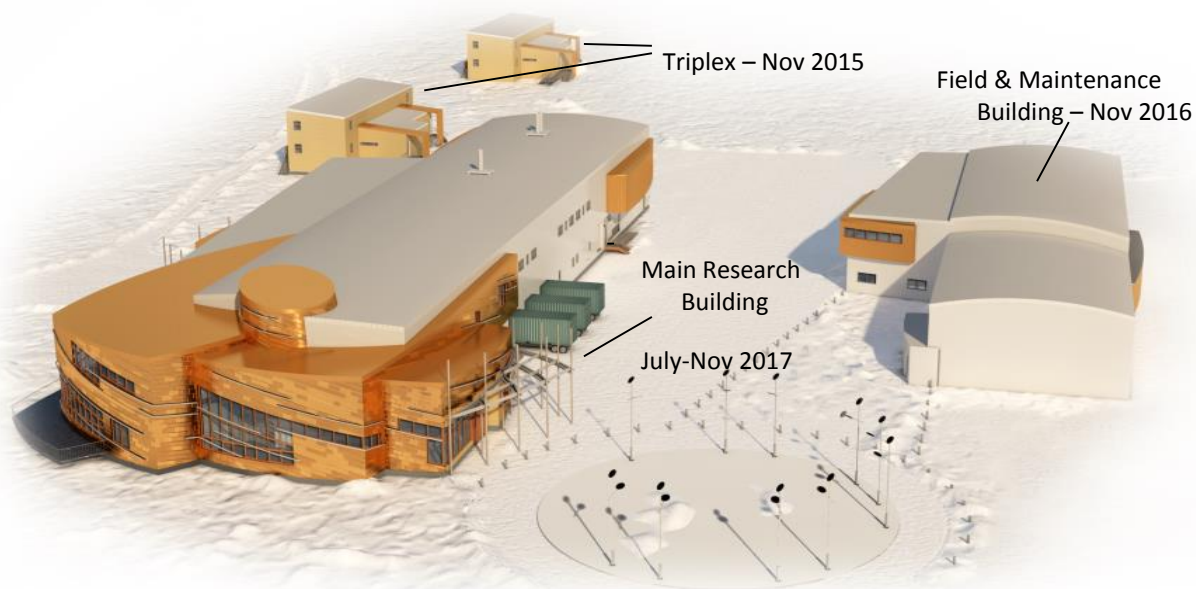


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CHARS Construction is Underway



➤ Construction of the Canadian High Arctic Research Station (CHARS) will be completed by 2017

➤ AANDC is leading the construction project of the CHARS facility, which will be transferred to POLAR upon completion in 2017

➤ CHARS will be a significant new addition to the existing pan-northern network of research infrastructure across the North (CNNRO), and contribute to Canada's Northern Strategy



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Linking S&T Priorities with Long-Term Outcomes

Priority Themes	Long-term outcomes	Short-term priority areas 2014-15 through 2018-19
Resource Development	<ul style="list-style-type: none"> Resource development that is economically and environmentally sound and promotes social development Renewable resources and unconventional energy sources that contribute to greater energy security and sustainability 	<ul style="list-style-type: none"> Alternative and renewable energy for the North Baseline information and monitoring to prepare for development
Exercising Sovereignty	<ul style="list-style-type: none"> Efficient and effective monitoring and surveillance of Canada's vast Arctic Effective management of Canada's Arctic waters under changing conditions Improved response to, and mitigation of, environmental and other disasters. 	<ul style="list-style-type: none"> Underwater situational awareness and associated marine research
Strong and Healthy Communities	<ul style="list-style-type: none"> Improved infrastructure and diversified economic opportunities Improved health outcomes and community wellness and resiliency 	<ul style="list-style-type: none"> Improving design and maintenance of northern physical infrastructure (Infrastructure for Development)
Environmental Stewardship and Climate Change	<ul style="list-style-type: none"> Effective environmental stewardship through greater knowledge of natural and human systems and their interconnections Strengthened mitigation efforts through greater understanding of changes in the Arctic climate and the links to global systems, and increased capacity to adapt. 	<ul style="list-style-type: none"> Predicting the impacts of changing ice, permafrost, and snow on shipping, infrastructure, and communities



Baseline Information Preparedness for Development/Cryosphere

Key Activity	Partners
Improving baseline information (ecosystem classification, VEC inventory , high resolution mapping & ecosystem sensitivity studies)	GNWT, GNU, NRCan, CACCON, CBMP, CWS, DFO, Vcr Aquarium, ARF, NASA, UAF, AWI, Japan (JAXA), CNNRO, U of Laval, etc.
Improved hydrological models for flood forecasting and hydro generation	CCRN, Yukon Government, GNWT, etc.
Improved Permafrost and Snow mapping, monitoring and modeling to support decision-making for communities and infrastructure	IASC, International Permafrost Association, Uni of Alberta, Canada Centre for Remote Sensing, Wilfred Laurier University, CNNRO, CCRN
Research into large ranging animals to better understand potential impacts of development (in the context of natural cycles and large-scale forcing)	GWNT, CARMA, Arctic Herbivory Network, University of Calgary, IASC, etc.
Permafrost mapping, monitoring and change modelling to understand impacts on infrastructure, vegetation and development	IASC, International Permafrost Association, Uni of Alberta, Canada Centre for Remote Sensing, Wilfred Laurier University, CNNRO, CCRN.

Monitoring

Key Activity	Partners
Coordination of ongoing monitoring activities	federal agencies (EC – WSC, MSC, CIS, CWS, AANDC-NGMP), territorial agencies (CIMP, wildlife branches, others), academic sites, CBM networks
Development of CAMPNet observatories	CNNRO, CCRN, NASA, CAFF-CBMP, INTERACT, communities, Arctic Research Foundation, Oceans North, ICC/ITK, ADAPT, international monitoring networks
Develop CHARS ERA as international Super Site	PKC Expert Monitoring Group, Canadian northern science community, other international partners, NASA, INTERACT, CAFF-CBMP, ADAPT, KIA, local TK
Develop CAOS Monitoring Plan	PKC Expert Monitoring Group, CFP partners, Canadian Polar Data Network, CAFF-CBMP, CIMP, NGMP
Produce first State of the Canadian Arctic Report	PKC Expert Monitoring Group, cooperating federal and territorial agencies, CAFF/CBMP,

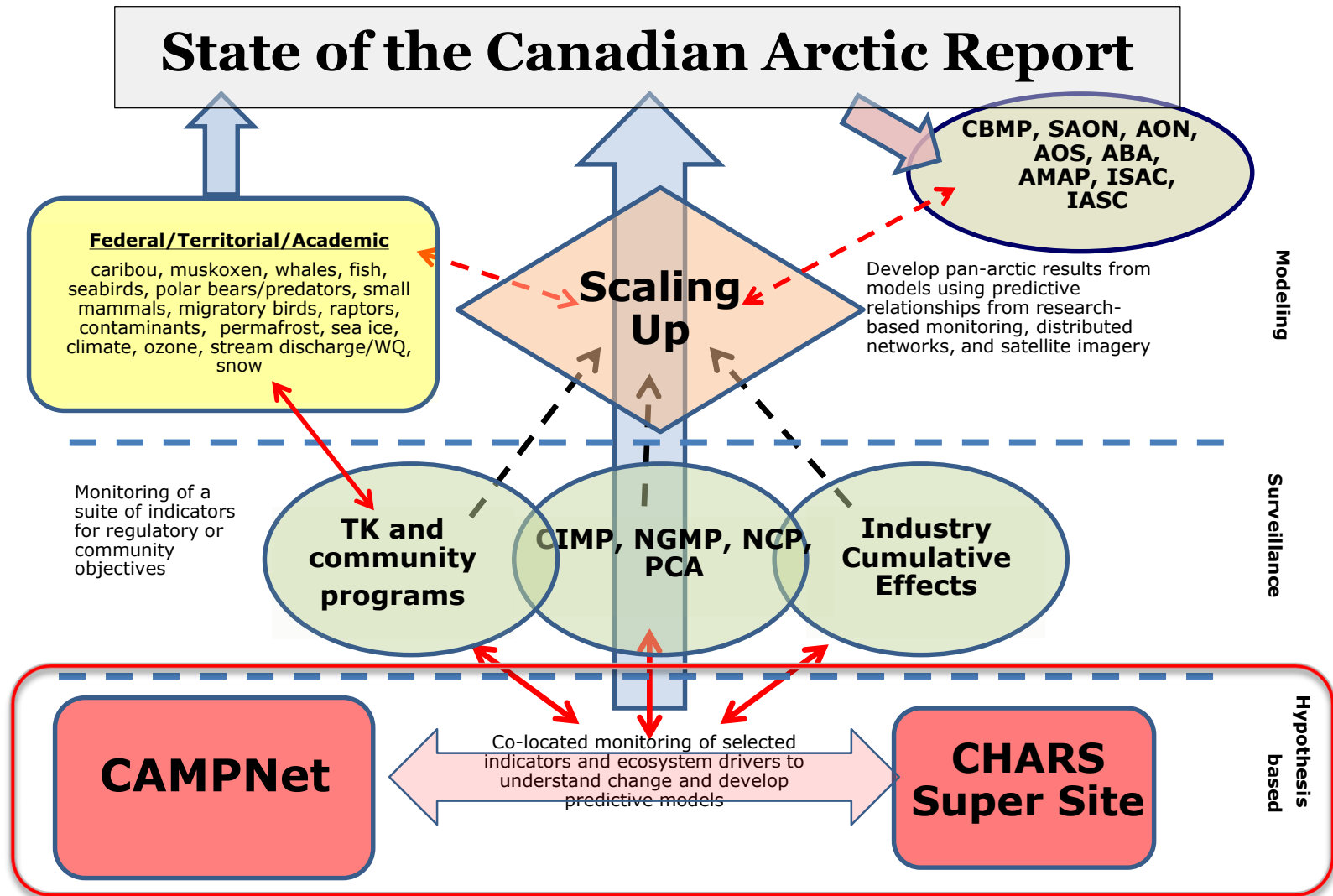


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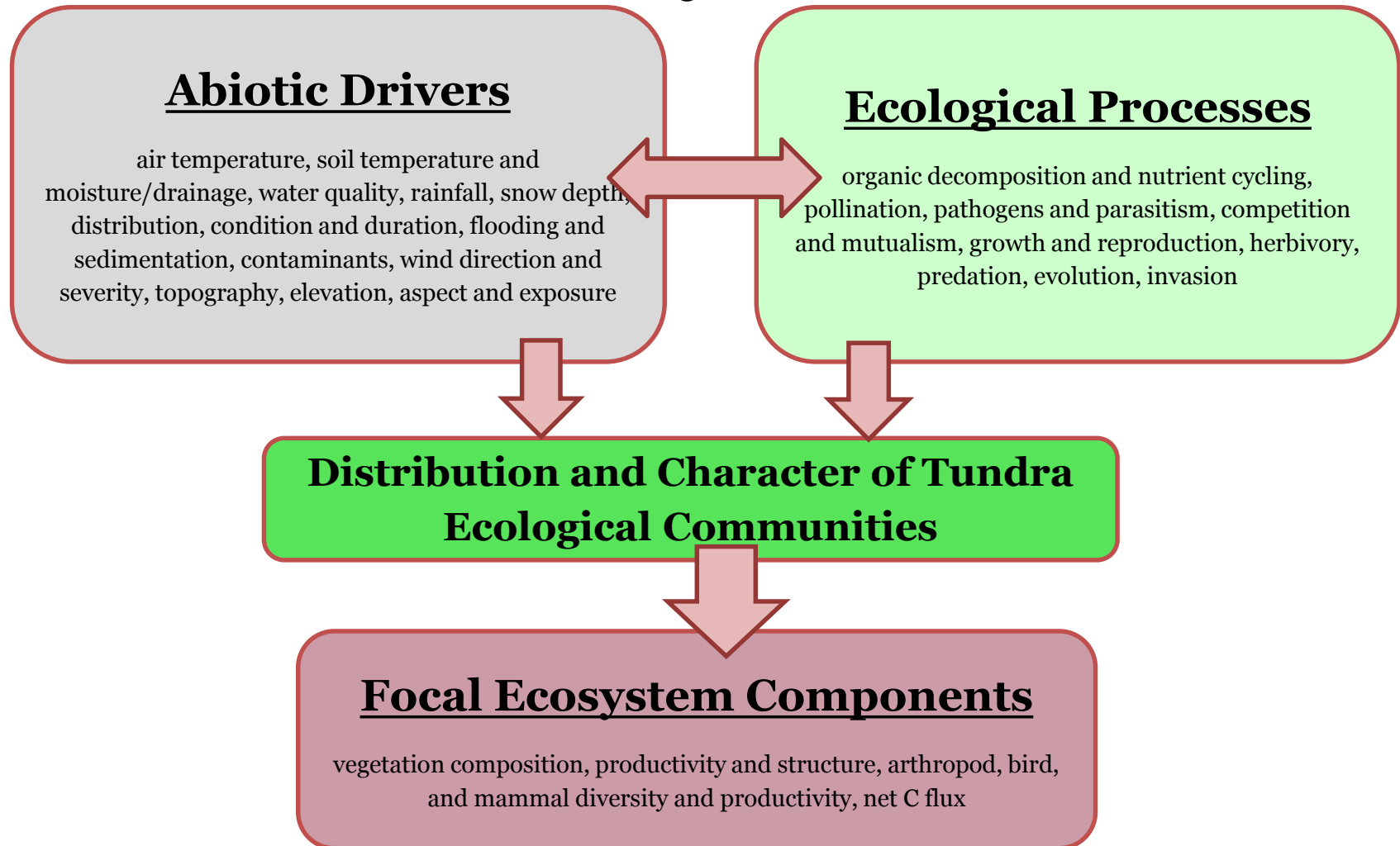


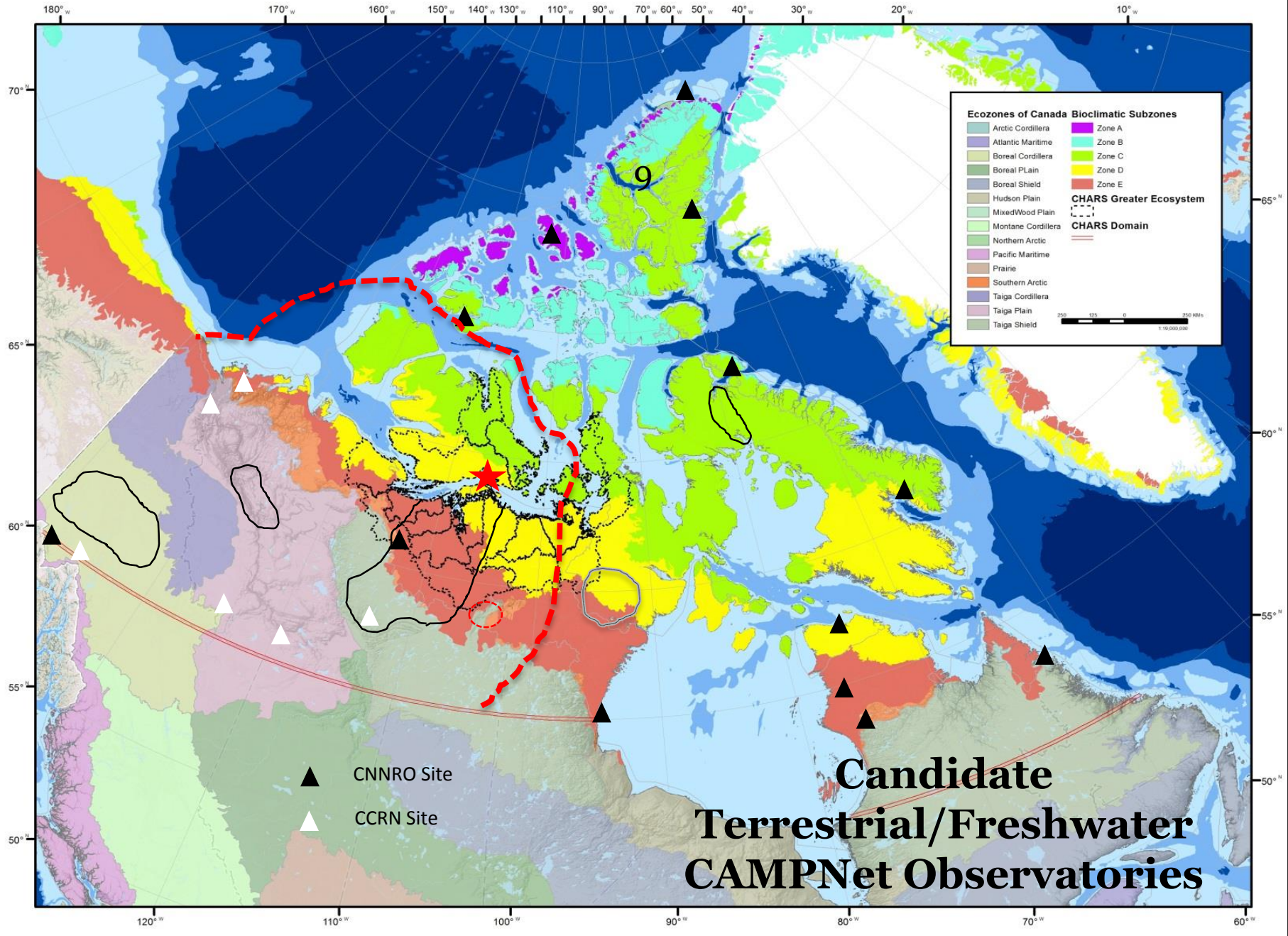
The Canadian Arctic Observing System



Hypothesis-based Monitoring (Terrestrial Ecosystems)

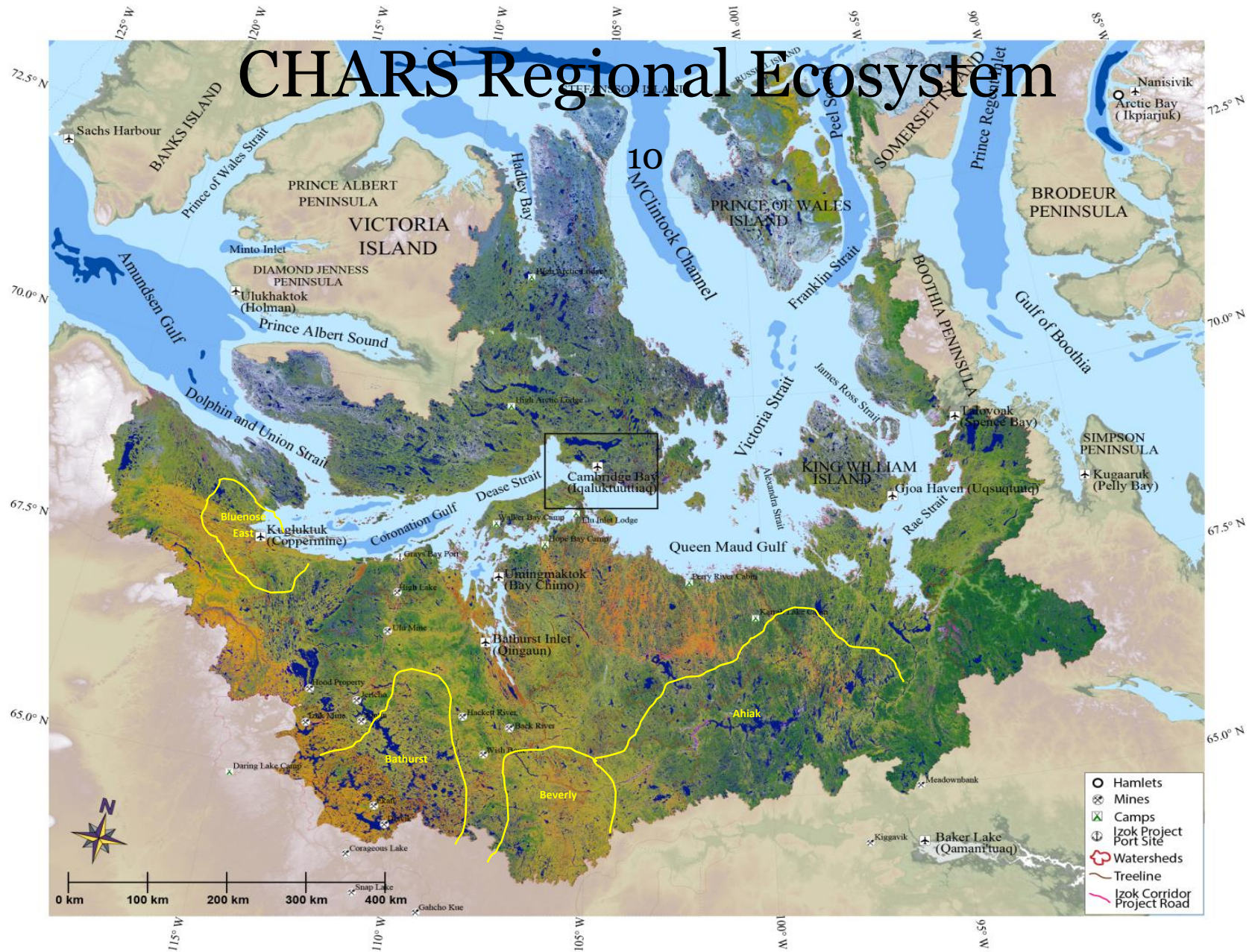
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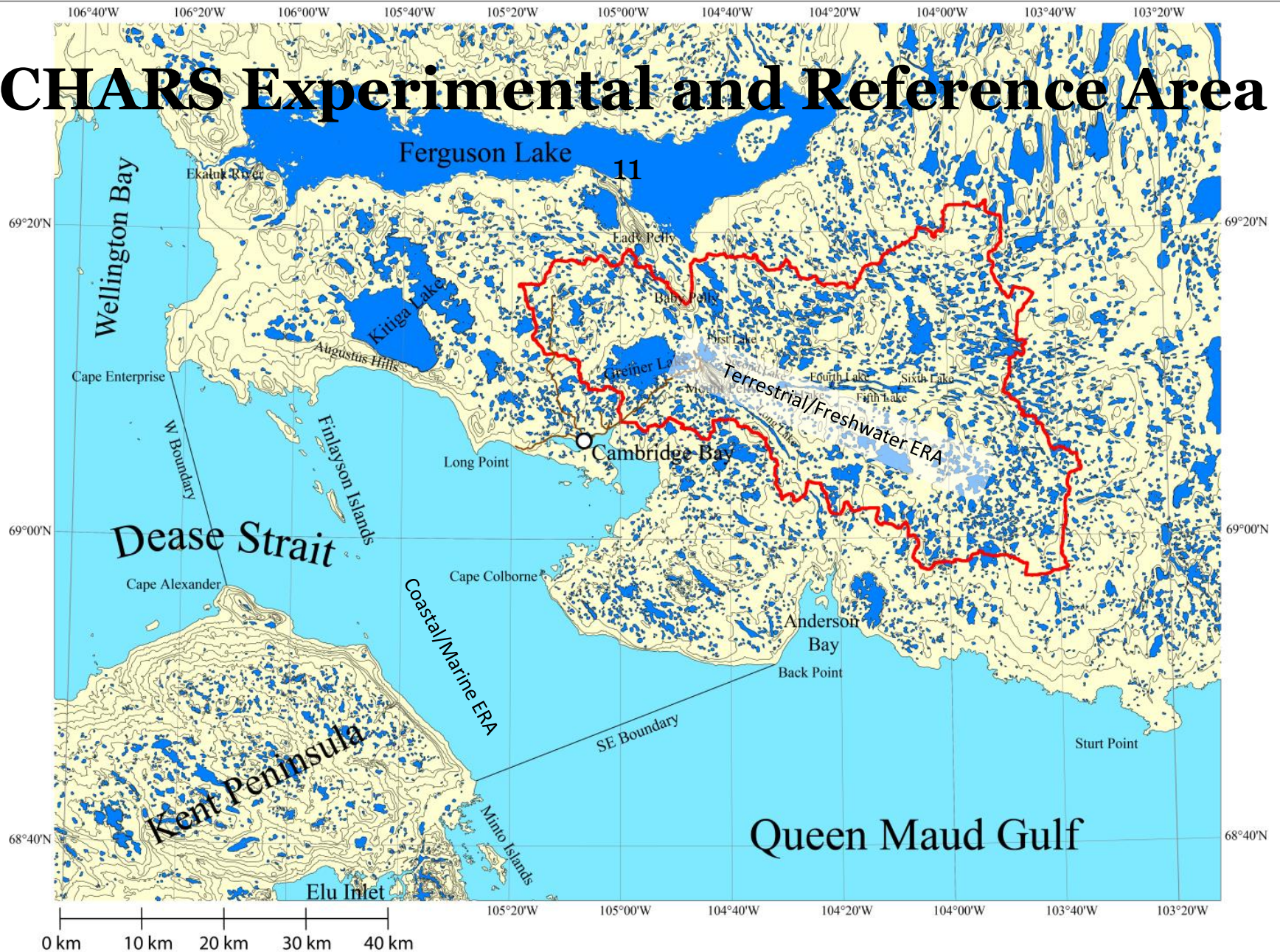
**Candidate
Terrestrial/Freshwater
CAMPNet Observatories**

CHARS Regional Ecosystem



- Hamlets
- ⊗ Mines
- ⊗ Camps
- ⊕ Izok Project Port Site
- ⊕ Watersheds
- Treeline
- Izok Corridor Project Road

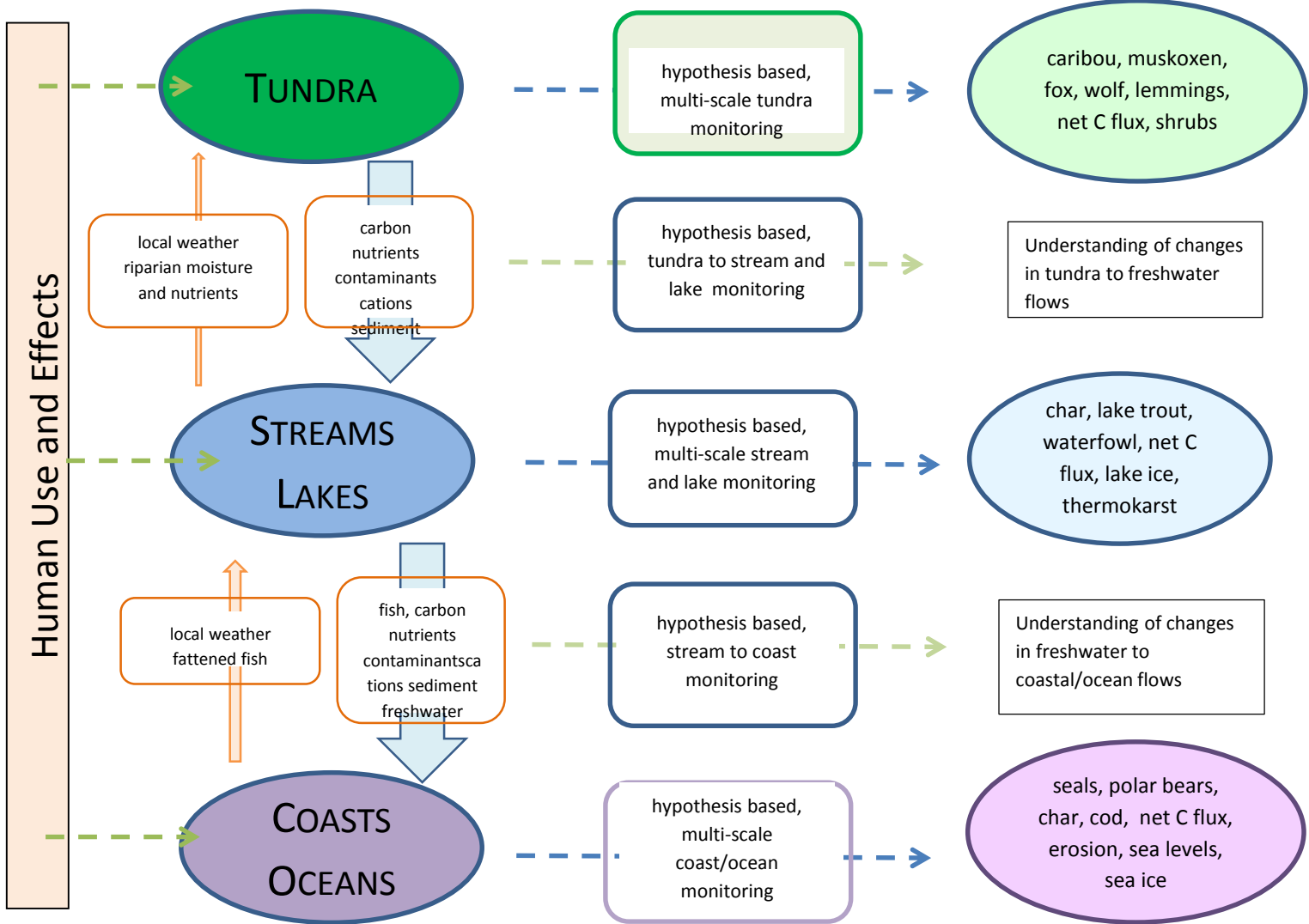
CHARS Experimental and Reference Area



CHARS Experimental and Reference Area

Super Site MONITORING

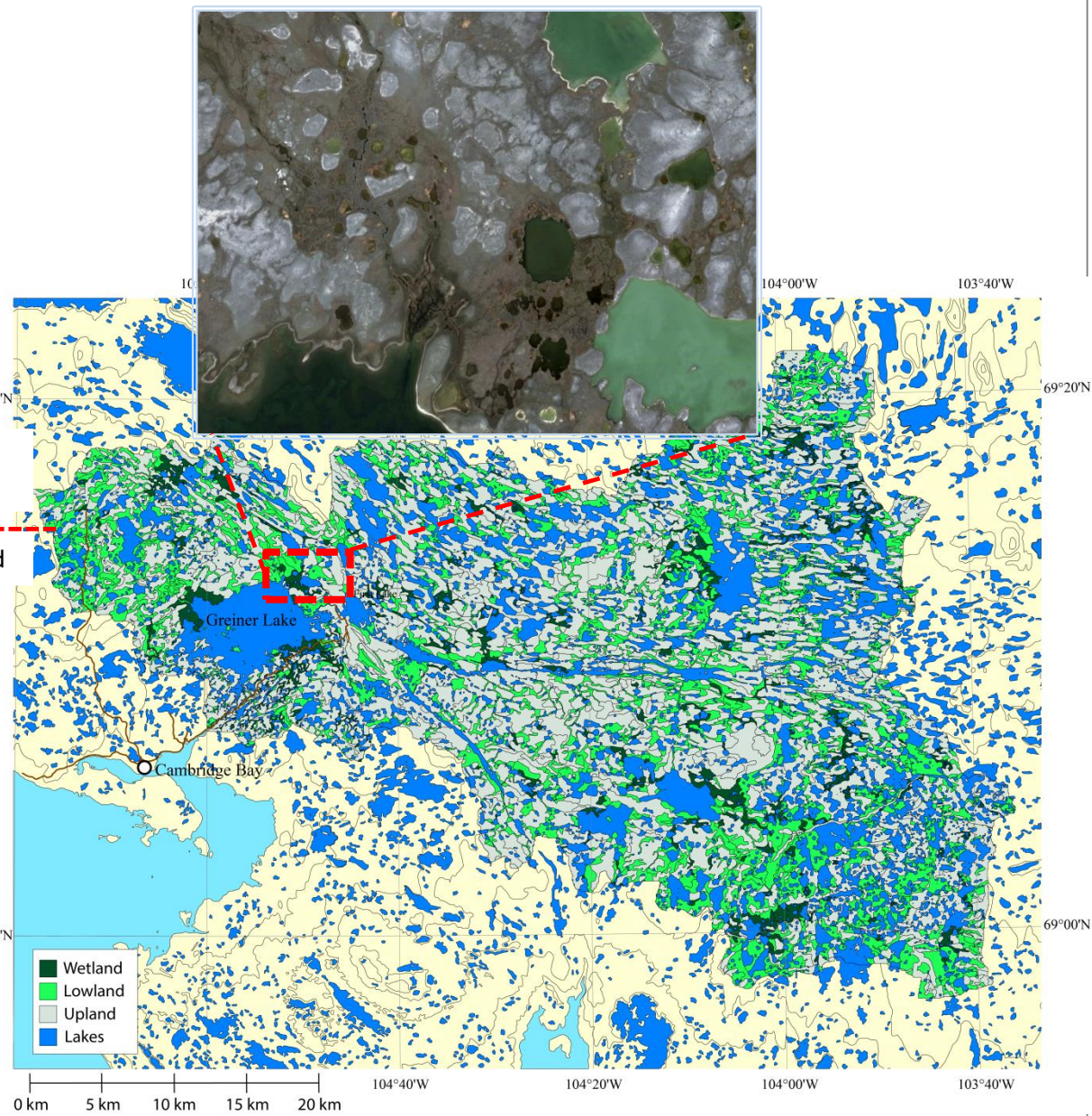
FECs - Useful INFORMATION



Snow Cover Regime

Relative	v. exp.	exposed	neutral	protected	v. protected
	A	B	C	D	E
very xeric 0					
xeric 1	02	xx1			
subxeric 2		01 (Lithic)			
submesic 3				xx2	
mesic 4			01		04
subhygic 5			05	03	06
hygic 6			07		
subhydryc 7			09	10	08
hydryc 8				11	

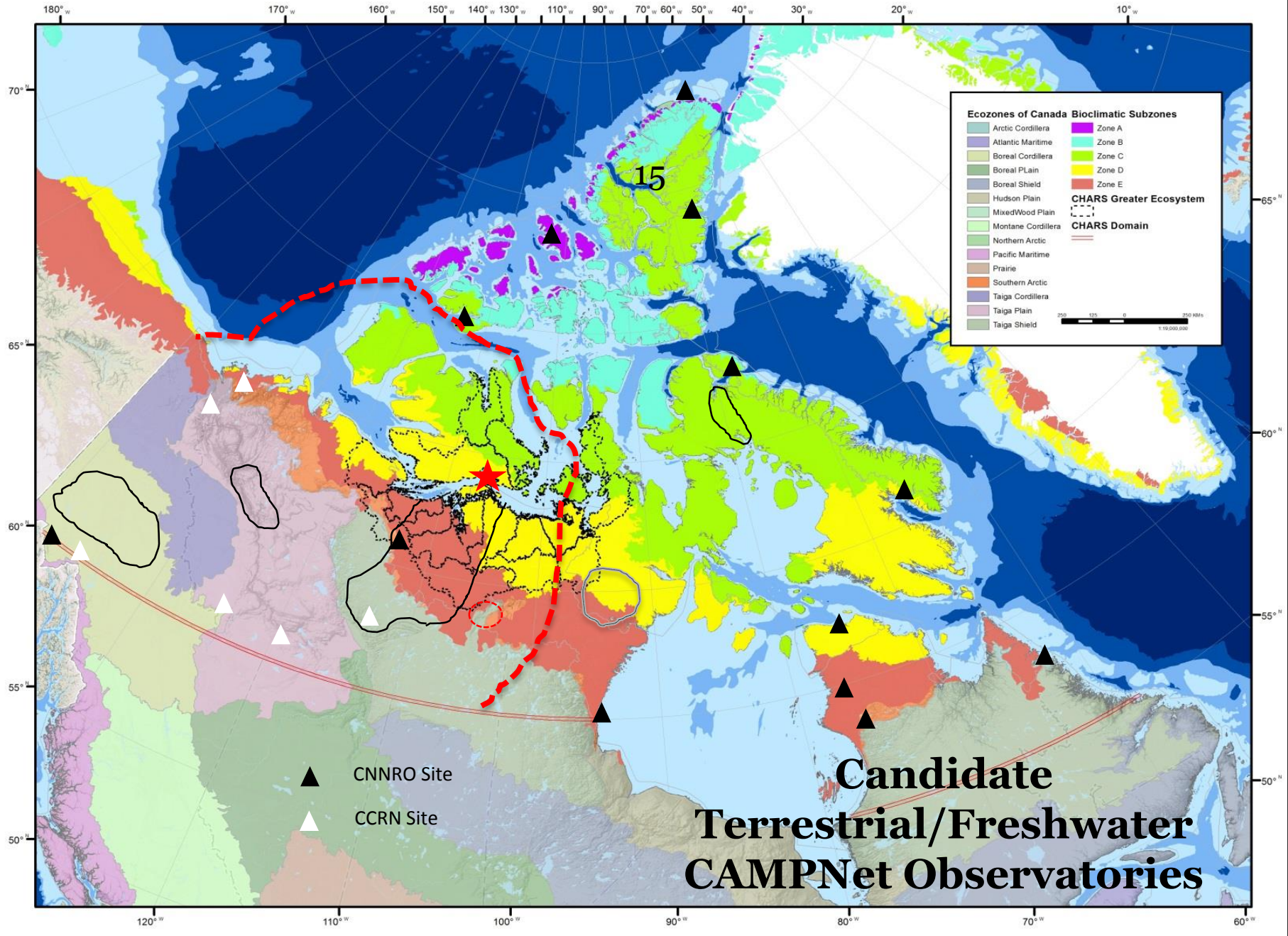
- Site Series
- 01 (Arc041) Mountain-avens - Curly sedge
 - 02 (Arc) Three-toothed Saxifrage - Blackish locoweed
 - xx1 (Arc) Arctic willow || xx2 Mountain-avens - Oxytropis
 - 03 (Arc) Mountain-avens - Net-veined willow
 - 04 (Arc027) Mountain-heather - Mountain-avens
 - 05 (Arc) Mountain-avens - Water sedge - Arctic willow
 - 06(Arc) xxMountain-avens - Horsetail - Bearberry||Polar willow^{69°00'N}
 - 07 (Arc) Arctic willow - Water sedge - Scordidium
 - 08 (Arc) Richardson's willow - Water sedge
 - 09 (Arc) Water sedge
 - 10 (Arc) Dupontia - Water sedge
 - 11 (Arc) *Arctophila fulva*



Baseline Studies – CHARS ERA

Research Area	Activities
Terrestrial ecosystems	Broad sampling and mapping of surficial geology, soils, vegetation; ecological community classification; vascular plant inventories; phenological studies; snow monitoring/modeling
Freshwater ecosystems	Weekly sampling of lake water parameters, microbiology, phytoplankton, zooplankton, benthos; benthic stream invertebrates, weekly sampling stream water chemistry
Arthropod Sampling and Monitoring	Broad surveys (pitfall, Malaise and dip net); weekly monitoring by ecological community
Mammals	Distribution mapping of slugs (musko xen lungworm vector); musko xen dieback surveys; small mammal distribution and pathogens
Planned Studies for 2016	Implementation of abiotic driver - ecological process – ecological outcome instrumented arrays in intensive monitoring area(s) – terrestrial and freshwater






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**Candidate
Terrestrial/Freshwater
CAMPNet Observatories**

ABOVE Template Responses

Template	Proposed PKC-CHARS Activities
Geospatial data	High to medium scale optical imagery; Landsat stacks; drone optical and other imagery; SAR (RS2, RCM); microwave
Modeling	Tundra ecological community models/maps using DEM and optical imagery; process-based models of FEC change reaching out from CAMPNet observatories to representative eco-regional areas; links to climate scenarios and adaptation implications; interactions of industrial/community development scenarios and VECs; ABOVE cloud computing
CoP Contributions	CBMP, ADAPT-IPA, ITEX, MSC, CNVC-AVA, FLUXNet, - (CNNRO, CCRN)
Products and Outcomes	Useful information to inform proactive adaptation approaches, e.g., implications of changing cryosphere (snow, PF, lake ice) on ecosystem attributes that impact ecosystems, communities and industry; standardized cumulative effects methodologies; land-climate feedbacks





Thank-you
Questions and Feedback?

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