

Alberta's Water Research and  
Innovation Strategy 2014: A Renewal

## Annual Report (2014-2015)



**Contact Address and phone numbers:**

Phipps-McKinnon Building  
10020, 101A Avenue, NW  
Edmonton, Alberta T5J 3G2

Phone: 780-427-5229  
780-415-6005

ISSN: 2371-2309 (print)  
2371-2317 (online)

ISBN: 978-1-4601-2936-4 (Print)  
978-1-4601-2937-1 (PDF)

# Contents

## **3 Acknowledgements**

---

## **4 Message from the Ministers**

---

## **5 Purpose and Background**

5 Purpose of the Annual Report

5 Background

8 Water challenges in Alberta and its water research and innovation system

---

## **10 Reporting and Evaluation**

10 Leadership and accountability

10 Types of reporting

---

## **11 Findings and highlights**

12 Innovation Focus - key highlights

17 Innovation Platforms - key highlights

20 Innovation Capacity - key highlights

---

## **26 Summary**

---

## **27 Appendix: AWRIS Evaluation Framework**

---

## **28 Definitions of Acronyms**

---

## **29 List of Contributing Organizations**

---

### **Tables**

13 Table 1. Summary of the results achieved under outcome “Innovation Focus”

18 Table 2. Summary of the results achieved under outcome “Innovation Platforms

22 Table 3. Summary of the results achieved under outcome “Innovation Capacity”

---

### **Figures**

5 Figure 1. Evolution of Alberta's Water Strategy and Alberta's commitment to water research

9 Figure 2: WIP investments (from AI-EES and other sources in 2014 -2015) and number of projects in various program theme areas

21 Figure 3. Number of academic programs (water-related) offered by various Institutions

21 Figure 4. Number of enrolments (in water-related programs) offered by various Institutions

---

## **29 References**

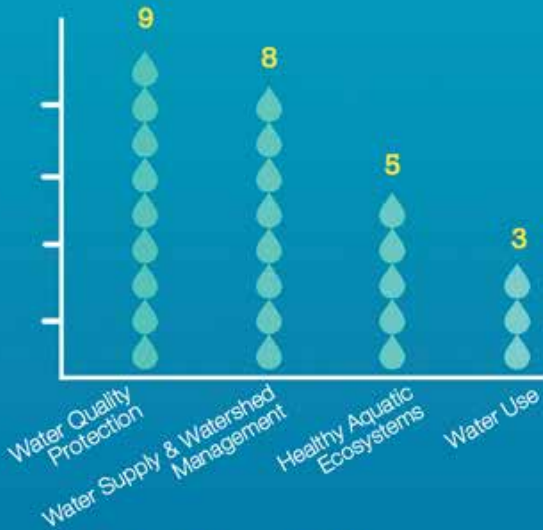
---

# In This Report

This report communicates the progress toward achieving Alberta's Water and Research Innovation Strategy (AWRIS) outcomes and actions, and identifies the areas for improvement and provides clarity on adjustments required.

Alberta Innovates - Energy and Environment Solutions launched The Water Innovation Program as a key tool to deliver on the AWRIS 2014.

Number of projects supported in each program area:



## Reporting and Evaluation

3 types of reporting will be implemented to demonstrate:



Progress on Actions



Achievement Toward Enabling Outcomes



Assessment of Effectiveness

## Enabling Outcomes

Innovation Focus (IF)



Investments in water research and innovation generate relevant, credible and reliable knowledge that support the strategic needs of Alberta's water resource system

Innovation Platforms (IP)



Technological and organizational environments are conducive to discovery and application, fueling innovation in Alberta's water resource system

Innovation Capacity (IC)



Water research (knowledge generators) and receptor (knowledge users) capacity enables knowledge to be effectively mobilized to create innovative solutions

## Acknowledgements

We would like to thank all stakeholders for participating in various sessions that were required for the formation of Alberta Water Research and Innovation Strategy 2014: A renewal (AWRIS) and providing their valuable perspectives in guiding our research and ultimately the development of the report.

We would like to thank the numerous government officials, experts, and members of the executive teams for providing their valuable input towards the development of strategy's reporting and evaluation framework, reviewing the report and providing their feedback. We acknowledge the Alberta Water Council for providing us pictures used in this report.



## Message from the Ministers



Honourable Deron Bilous  
Minister of Economic  
Development and Trade

On behalf of the Government of Alberta, we are pleased to present the first annual report (2014-2015) for Alberta's Water Research and Innovation Strategy (AWRIS) 2014: A Renewal. This report demonstrates the progress we are making toward the development of solutions to support economic development and protecting our water for the benefit of Albertans.



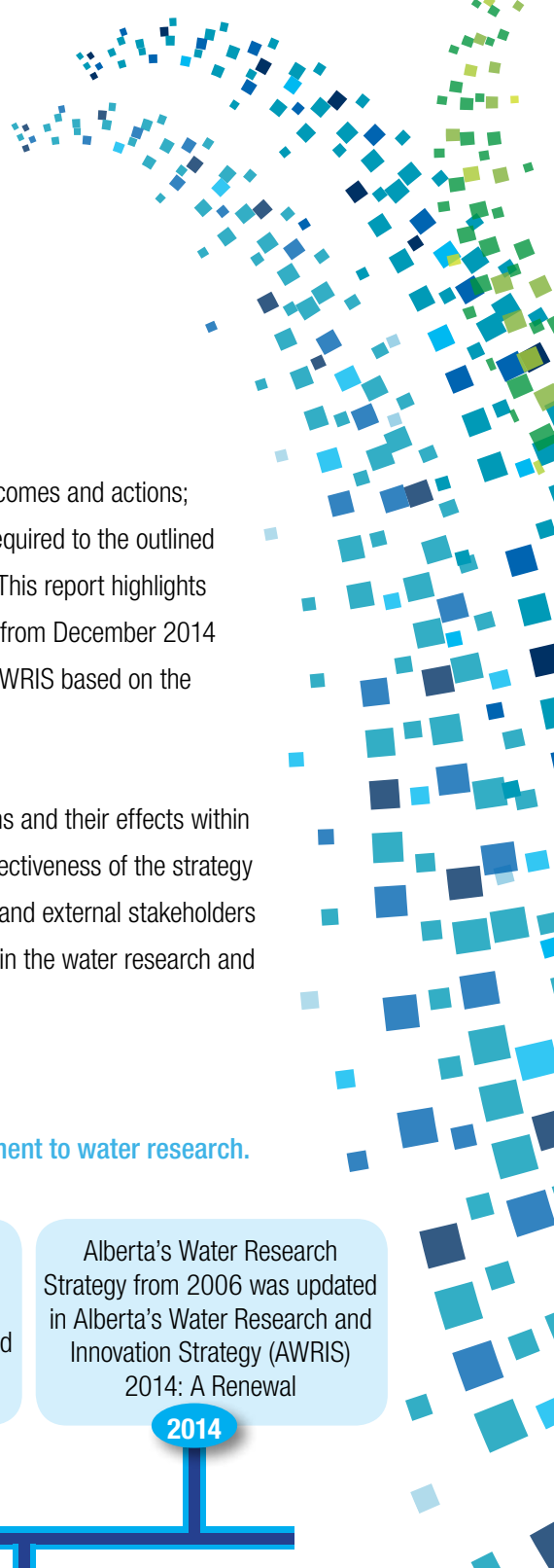
Honourable Shannon  
Phillips  
Minister of Environment  
and Parks

Water is essential for life. It is necessary for the survival of all living things and fundamental to the preservation of our environment. Water plays a critical role in Alberta's energy, environment, and agricultural sectors along with recreational activities. Through strategic investments and leadership in water research and innovation, we can ensure that Alberta's water quality and quantities remain strong for the future.

Through AWRIS, our government is focusing attention on action oriented activities and policies that help ensure the sustainable management of water resources. AWRIS enhances our ability to respond to varying demands on our water resources and increases opportunities for economic growth. The strategy and its annual report reflect the perspectives, insights, and advice from many sector experts, internal and external stakeholders.

We would like to thank all those who guided, assisted, and coordinated efforts to provide the data needed to create this annual report. Data in this report will serve as a baseline for assessing the effectiveness of the strategy in enabling advances in water research and innovation throughout Alberta.





## Purpose and Background:

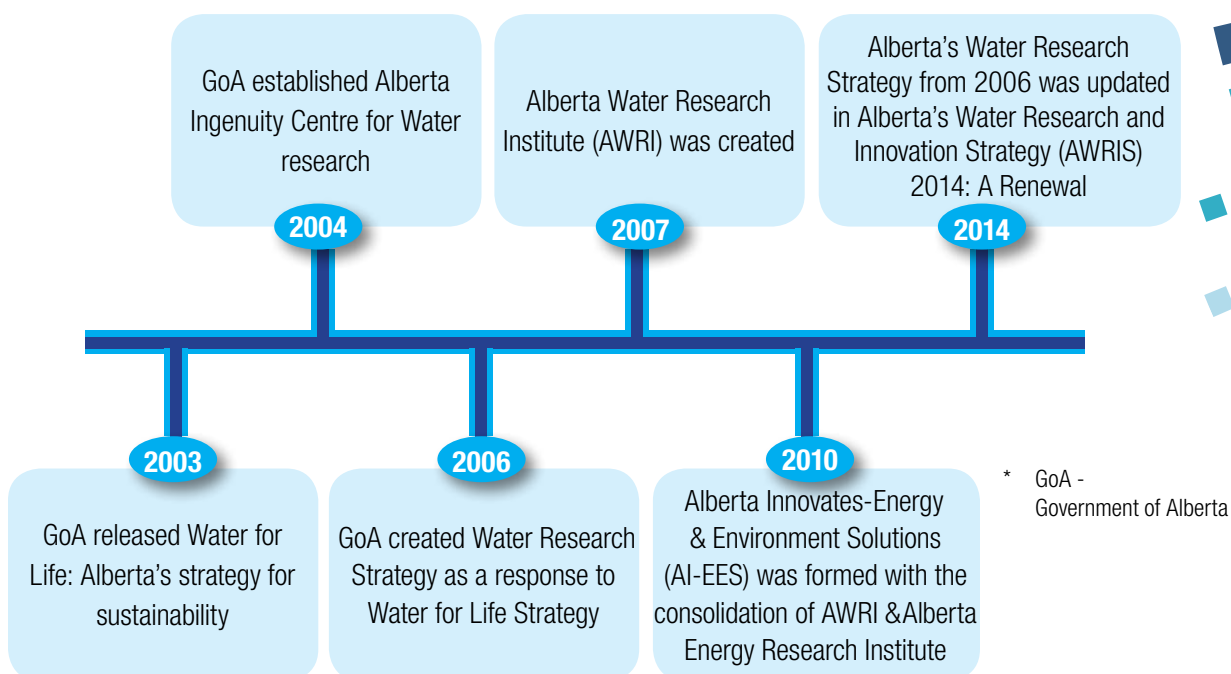
### Purpose of the Annual Report:

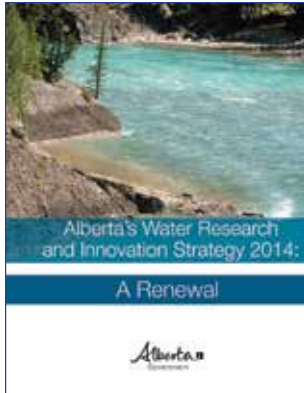
This annual report communicates the progress toward AWRIS enabling outcomes and actions; identifies the areas for improvement; and provides clarity on adjustments required to the outlined actions. This is the first annual report following the release of the strategy. This report highlights water research and innovation-related activities undertaken in the province from December 2014 to December 2015 towards the achievement of the enabling outcomes of AWRIS based on the information provided by key stakeholder organizations.

Progress against the actions will be measured annually to assess the actions and their effects within the shorter time frame. It will serve as a baseline data for assessing the effectiveness of the strategy in the longer term. This annual report intends to update Albertans, internal and external stakeholders about the implementation activities, identified gaps, and new opportunities in the water research and innovation system.

### Background:

Figure1. Evolution of Alberta’s Water Strategy and Alberta’s commitment to water research.





AWRIS is a provincial guiding document for Alberta's water research and innovation system. It provides fresh direction and focus that is consistent with the continuing knowledge and research needs of Water for Life: Alberta's Strategy for Sustainability. It capitalizes on the strengths of researchers, practitioners and technology developers; guides research investments; and promotes collaboration and action among government departments and other water-related organizations to integrate water research and innovation across research and policy domains. AWRIS is in alignment with Alberta Environment and Parks's

(AEP) Water for Life Strategy and Our Water, Our Future - a Plan for Action.

AWRIS is a co-led initiative between Alberta Economic Development and Trade (AEDT) and AEP. Developing AWRIS and its annual report reflect the perspectives, insights, and advice from many sector experts, internal and external stakeholders. The annual report provides a summary of the progress that has been made in the last year in the provincial water-related research and innovation system.

#### **Purpose:**

- Alberta's water research and innovation system creates and applies relevant, reliable and credible knowledge that leads to a high-performing, innovative and responsive water resource system.

#### **Guiding Principles:**

- **Relevant:** Alignment of research and knowledge generated with the priorities of Alberta's water resource system.
- **Collaborative:** Elevating the quality and focus of engagement with national and international research communities.
- **Transparent:** Open and transparent approach resulting in credible and reliable information and knowledge to inform policy and management actions.
- **Adaptive:** Flexible and responsive to the dynamic contextual environment in which it operates.
- **Quality:** Excellence in research and innovation system.



### **Water for Life - Goals:**

- Safe and secure drinking water.
- Healthy aquatic ecosystems.
- Reliable and quality water supplies for a sustainable economy of the province.

### **Water for Life - Key Directions:**

- Partnerships
- Knowledge and Research
- Water Conservation

### **Stakeholders:**

- Government of Alberta ministries and agencies
- Post - Secondary Institutions
- Not-for-profit organization
- Industry
- Other organizations



## Water challenges in Alberta and its water research and innovation system:

Despite the recent economic downturn in Alberta and other calamities such as wildfires, demands on provincial water resources continue. Population growth also places new and challenging demands on our water resources to support an expanding economy, increasing agricultural production, energy development, environmental performance, and a response to climate change and variability. These challenges can be addressed in part through a strong water-centred research and innovation system in the province. The alignment of the outcomes from research and innovation and water resources is important to generate advances in policy, products and services as mentioned in AWRIS itself.



Alberta Innovates - Energy and Environment Solutions (AI-EES) launched the Water Innovation Program (WIP) as a key tool to deliver on AWRIS. By investing in water research, we can achieve meaningful advancement in knowledge, innovations, and technologies for our water resources. This program is focused on four themes:

- 1) Future water supply and watershed management
- 2) Healthy aquatic ecosystems
- 3) Water use conservation, efficiency and productivity
- 4) Water quality protection

AI-EES maximizes its investments by working with the national and international research communities as well as with academic, government and industry partners.

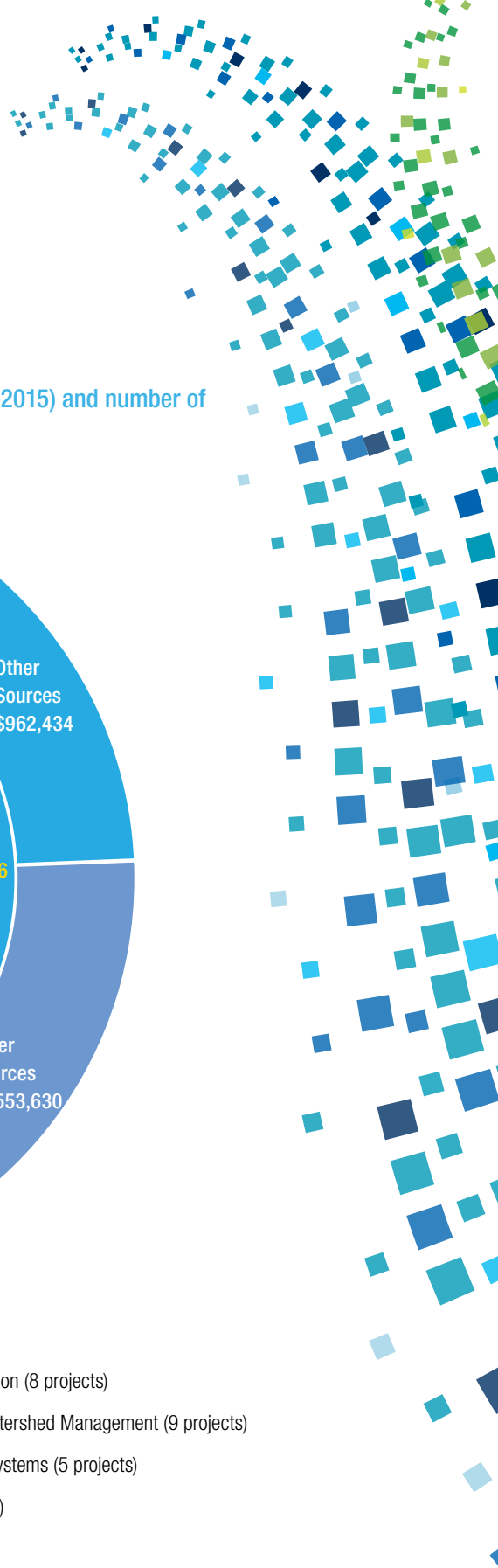
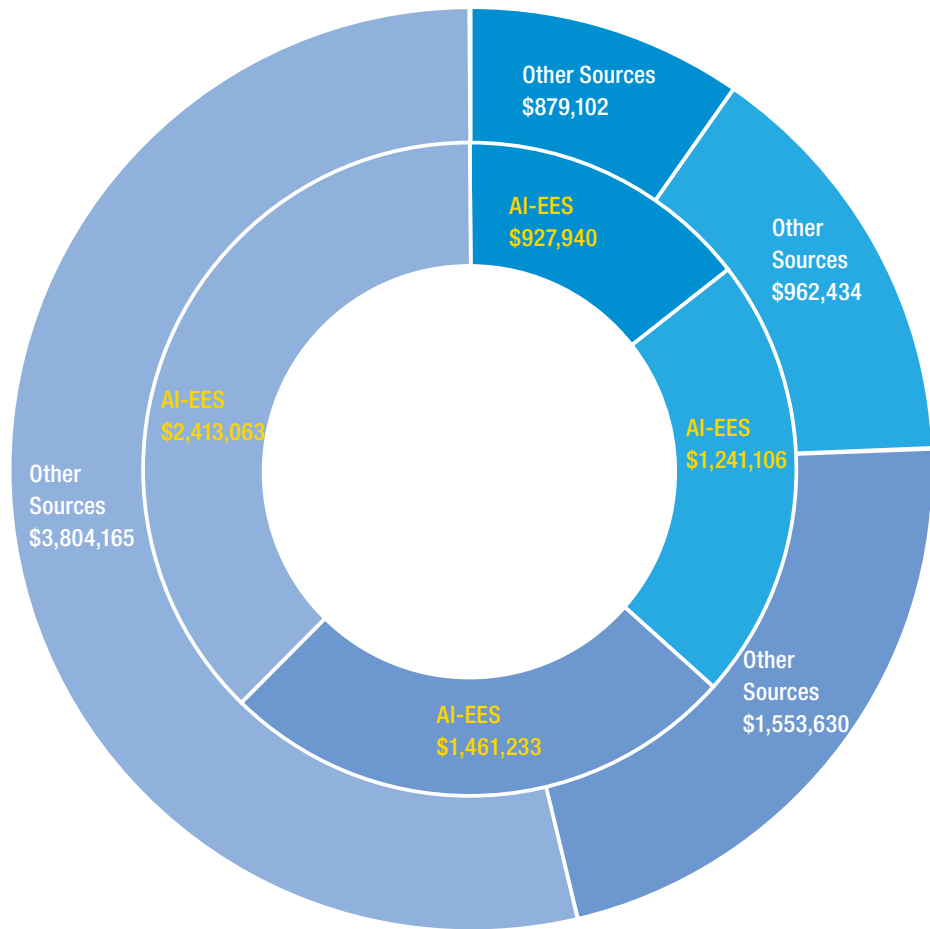


Figure 2: WIP investments (from AI-EES and other sources in 2014 -2015) and number of projects in various program theme areas



- Water Quality Protection (8 projects)
- Water Supply and Watershed Management (9 projects)
- Healthy Aquatic Ecosystems (5 projects)
- Water Use (3 projects)

## Reporting and evaluation

AWRIS is committed to the principle of transparency. To support this principle, a robust mechanism for measuring the success of the implementation of the strategy was put in place. AWRIS enabling outcomes and accompanying actions are only a starting point for guiding water-related investments. This framework is intended to be flexible and adaptable, and will be reviewed periodically to ensure it continues to be efficient and effective in meeting the evaluation and reporting requirements.

### Leadership and accountability:

Implementation of AWRIS is being led by two ministries: AEDT and AEP. These ministries will report on the progress toward the actions and enabling outcomes of AWRIS. In addition, government is relying on the research community, partners and other stakeholders (such as industry and environmental non-government organizations) in achieving the outcomes through additional actions.

### Types of Reporting:

As indicated in AWRIS, three types of reporting will be implemented:

- 1) Progress on Actions: assessing achievement of the actions directed at outcomes within the strategy on an annual basis.
- 2) Achievement toward Enabling Outcomes: reporting on the effectiveness of the strategy in enabling advances and detecting the aggregate effect of actions towards realizing the enabling outcomes for water research and innovation. This reporting cycle will be completed every three years.
- 3) Assessment of Effectiveness and Impact: evaluating the overall effectiveness and impact of the Strategy in contributing to the outcomes of the water resource system in Alberta. The impact assessment will be completed after 10 years.

## Findings and highlights



The AWRIS identified three key enabling outcomes: Innovation Focus (effectiveness of investments supporting the strategic needs of provincial water resource system); Innovation Platforms (technological and organizational environments) and Innovation Capacity (water research knowledge being effectively mobilized to create innovative solutions).

A workshop with various stakeholders was held with the release of AWRIS to inform implementation. The aim of this workshop was to enable conversation amongst the

participants and to gain an understanding of the work currently being done to advance progress on the actions and achieve the enabling outcomes of the Strategy. As a result of the workshop and conversations held with different groups, several indicators were developed for assessing the achievement of the actions directed at outcomes within the strategy.

Collaboration, working together by sharing information is key to achieving the purpose of the strategy. Stakeholders supported the work of this report by providing their valuable input. Data for this report was collected from water-related internal and external stakeholders. They provided reports on their contributions and updates on completed and ongoing water-related activities in the province for the period of December 2014 – December 2015.

These results are summarized in a table for each enabling outcome of the strategy in the following section. Above each table, the key achievements of that outcome are listed.

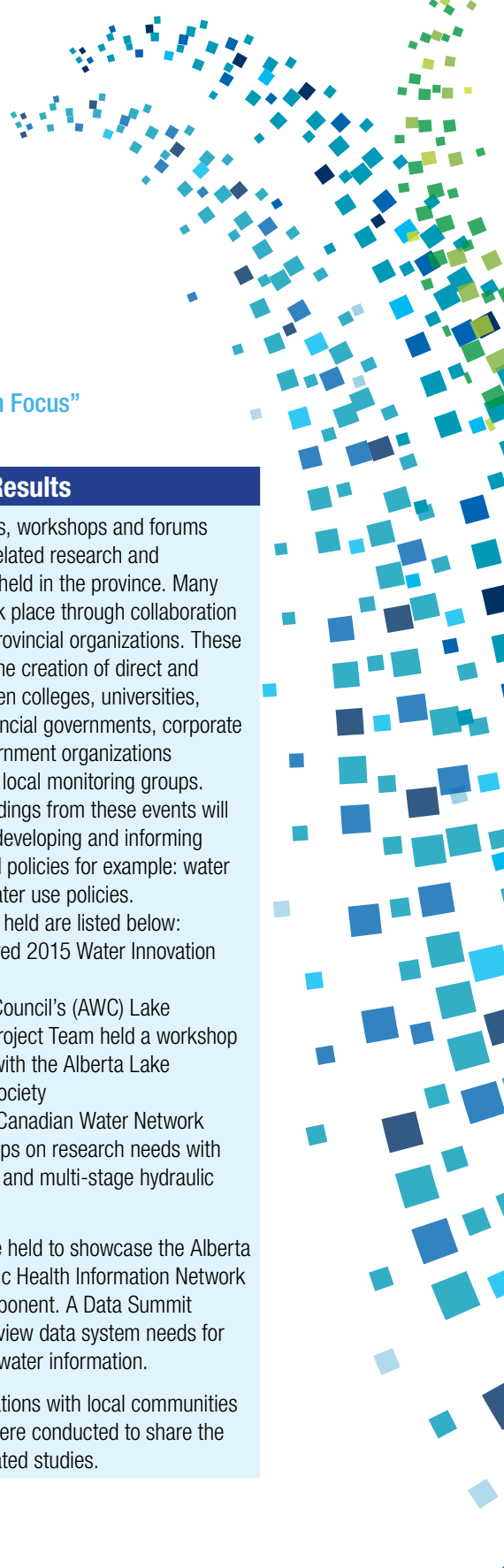
### Enabling Outcomes:

**Innovation Focus (IF):** Investments in water research and innovation generate relevant, credible and reliable knowledge that support the strategic needs of Alberta's water resource system.

### Innovation Focus - key highlights:

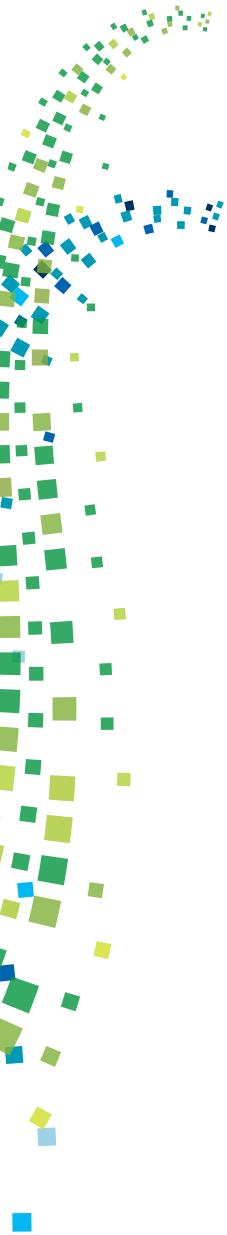
- AI-EES co-sponsored "EnviroAnalysis 2015 conference, held in Banff. It was the first time that EnviroAnalysis was held in western Canada. The conference provides attention to the critical importance of chemical analysis and monitoring in environmental research. AI-EES and Alberta Innovates – Technology Futures (AITF) received EnviroAnalysis Sponsors' awards in recognition of their contributions and support of environmental education, communication and technology transfer activities.
- WaterSMART led work investigating climate vulnerability and sustainability in the South Saskatchewan River Basin (SSRB) which has resulted in some changes in the operations of Ghost Reservoir so that it can be managed to accommodate both drought and flood risk. In connection with work led by Dr. Stewart Rood from the University of Lethbridge, dam operators are also managing for functional environmental flows in the Oldman River and are expanding its application to other basins in the SSRB in support of improved riparian and aquatic ecosystem health.
- Investments (from Alberta Irrigation Projects Association [AIPA] & AI-EES) led to an upgraded and modernized comprehensive irrigation water demand model that is capable of predicting water use in all 13 irrigation districts.
- Investments were directed to address the identified knowledge and technology gaps in the Water research and innovation agenda of the province. 25 projects were funded through WIP in 2015 (total investment of \$6.04M). These projects involved 88 highly qualified personnel (HQPs), 57 collaborators and 14 institutions while generating 40 peer-reviewed publications. Although at early stages, outstanding outcomes have been achieved through a number of these projects that have enabled major business and partnership opportunities.
- AI-EES has been recognized by Canada's Oil Sands Innovation Alliance (COSIA) and has been invited to participate in its \$150M Water Technology Demonstration Centre (WTDC) and the planned \$80M End-Pit Lake Demonstration facility. This will allow AI-EES to bring research priorities of the GoA to these facilities and leverage on the investments being made by industry in support of water use efficiency and water quality protection.





**Table 1: Summary of the results achieved under outcome “Innovation Focus”**

Actions	Indicators	Results
<p><b>IF-1</b> Implement mechanisms that engage government, academia, and industry in the assessment of water research and innovation priorities, key opportunities and principle initiatives.</p>	<p>Conferences and workshops are held to engage government, academia and industry that will inform priority decisions and identify opportunities and initiatives.</p>	<ul style="list-style-type: none"> <li>▪ Several conferences, workshops and forums focused on water-related research and management were held in the province. Many of these events took place through collaboration between multiple provincial organizations. These events resulted in the creation of direct and key linkages between colleges, universities, municipal and provincial governments, corporate partners, non-government organizations and watershed and local monitoring groups. Evidence-based findings from these events will be instrumental in developing and informing future water-related policies for example: water reuse and storm water use policies. Some of the events held are listed below:               <ul style="list-style-type: none"> <li>- AI-EES sponsored 2015 Water Innovation Program Forum</li> <li>- Alberta Water Council’s (AWC) Lake Management Project Team held a workshop in partnership with the Alberta Lake Management Society</li> <li>- Participated in Canadian Water Network (CWN) workshops on research needs with regard to water and multi-stage hydraulic fracturing.</li> </ul> </li> <li>▪ Four seminars were held to showcase the Alberta Environmental Public Health Information Network drinking water component. A Data Summit held with AEP to review data system needs for managing drinking water information.</li> <li>▪ Numerous presentations with local communities and stakeholders were conducted to share the results of water related studies.</li> </ul>

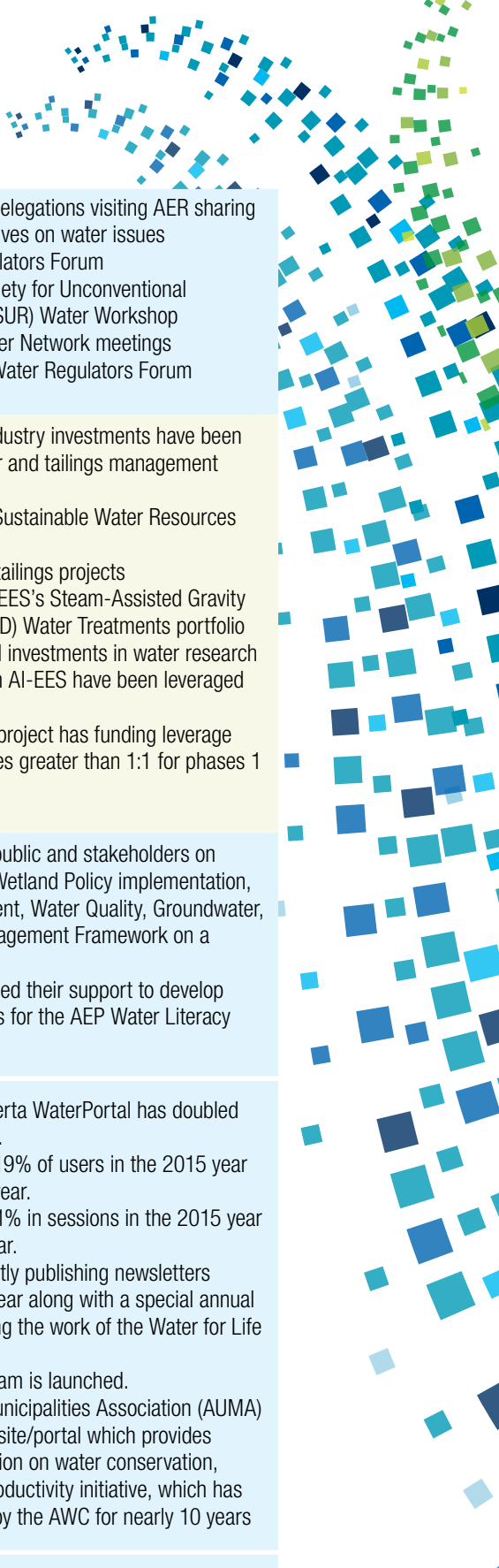


Research investments are addressing priorities identified by government in water research.

- In 2015, 25 projects were funded in the WIP and 5 projects were completed. These projects support improvements in water management policy, planning, regulations and operational practices.
- In 2015, AIPA invested \$30,000 in a development project to upgrade and modernize a comprehensive irrigation water demand model (IDM-3) that predicts water use in all 13 irrigation districts; AI-EES contributed \$80,000 to the project this year. The total cost of the project is \$350,000 from Nov 2013 through Feb 2016. This model can be used with other river basin models to evaluate water management and use in rivers within the SSRB.
- Water reuse project and Room for the river projects funded by AEP.

Mechanism is in place where GOA/ Alberta Innovates can interact with provincial and international organizations to identify opportunities to influence the water research agenda.

- Survey conducted with government departments, agencies and other stakeholders to identify “Water for Life” knowledge and technology gaps and water-related needs. The survey provided considerable direction for investment decisions in the 2015 open call for new projects in WIP.
- Presentations and participation on Alberta Health Services Drinking Water and Natural Recreational Water Committees led to the identification of local drinking and recreational water issues.
- Participation between CWN and AI-EES to coordinate and share opportunities for workshops and technical evaluation of new projects where priorities align.
- GoA participation in national committees such as Canadian Council of Ministers of the Environment (CCME).
- GoA partnerships with Netherlands Statement of Intent for collaboration on water management. The purpose is to provide the framework for the exchange of knowledge, experience and technologies to enhance the capacities to address water management issues between Alberta and Netherlands.
- GoA sharing perspectives with visiting international delegations.
- Alberta Energy Regulator (AER) and/or Alberta Geological Survey(AGS) interaction:
  - AER-Deltares Memorandum of Understanding (MOU)
  - Interstate Oil & Gas Compact Commission membership
  - Ground Water Protection Council meeting attendance



		<ul style="list-style-type: none"> <li>- International delegations visiting AER sharing their perspectives on water issues</li> <li>- Western Regulators Forum</li> <li>- Canadian Society for Unconventional Resources (CSUR) Water Workshop</li> <li>- Canadian Water Network meetings</li> <li>- International Water Regulators Forum</li> </ul>
<p><b>IF-2</b> Enable the appropriate business environment and partnership opportunities to increase investment from private enterprise in innovative products, processes and services that improve water-related environmental outcomes.</p>	<p>Provincial investment in water research projects is leveraged greater than 1:1</p>	<ul style="list-style-type: none"> <li>▪ \$37.7M direct industry investments have been attracted in water and tailings management including             <ul style="list-style-type: none"> <li>- \$2.2M to the Sustainable Water Resources projects</li> <li>- \$2.0M in two tailings projects</li> <li>- \$33.5M to AI-EES's Steam-Assisted Gravity Drainage (SAGD) Water Treatments portfolio</li> </ul> </li> <li>▪ Current provincial investments in water research managed through AI-EES have been leveraged 3.1:1.</li> <li>▪ Athabasca River project has funding leverage from other sources greater than 1:1 for phases 1 and 2.</li> </ul>
<p><b>IF-3</b> Engage in public discussions on water research and technology advances and challenges, using researchers, sector leaders and thought leaders to increase public awareness, engagement and debate on water resources issues.</p>	<p>Knowledge developed in WIP supports material developed under AEP's Water Literacy Program</p>	<ul style="list-style-type: none"> <li>▪ AEP works with public and stakeholders on topics including Wetland Policy implementation, Water management, Water Quality, Groundwater, and Tailings Management Framework on a regular basis.</li> <li>▪ AWC team provided their support to develop recommendations for the AEP Water Literacy Program</li> </ul>
	<p>Traffic to OSIP, AEMERIS, and other water-related websites increased</p>	<ul style="list-style-type: none"> <li>▪ Traffic to the Alberta WaterPortal has doubled over the last year.             <ul style="list-style-type: none"> <li>- An additional 119% of users in the 2015 year over the 2014 year.</li> <li>- An additional 91% in sessions in the 2015 year over the 2014 year.</li> </ul> </li> <li>▪ AWC is consistently publishing newsletters three times per year along with a special annual edition highlighting the work of the Water for Life partnerships.</li> <li>▪ Online WIP program is launched.</li> <li>▪ Alberta Urban Municipalities Association (AUMA) has water micro-site/portal which provides valuable information on water conservation, efficiency and productivity initiative, which has been supported by the AWC for nearly 10 years</li> </ul>
	<p>GOA/ AI/ and PSI staff are speaking at events on water issues</p>	



		<ul style="list-style-type: none"> <li>▪ AI-EES Water and Environmental management staff gave 25 presentations related to the WIP portfolio.</li> <li>▪ GoA staff delivered approximately 30 presentations on water related topics.</li> </ul>
<p><b>IF-4</b> Invest in trans-disciplinary team-based research and innovation in areas of strategic priority to facilitate the emergence of innovative water policy and practice.</p>	<p>Sector leaders and researchers are engaged to speak at conferences forums or public events</p>	<ul style="list-style-type: none"> <li>▪ AEP, Alberta Agriculture and Forestry (AAF) and Alberta Health (AH) speak often at conferences, forums and events about solving provincial scale water issues that affect multiple stakeholders. The AWC also runs multi-stakeholder project teams that make consensus-based decisions on water issues through consensus.</li> </ul>
	<p>Trans-disciplinary teams are formed to address complex nature of water research</p>	<ul style="list-style-type: none"> <li>▪ Most projects are employing trans-disciplinary team based approach e.g. WIP projects, major irrigation demand model, provincial groundwater inventory program, template for Groundwater Management Framework, and Tailings Management Framework. This team-based approach requires collaboration among local, provincial, national and international water experts.</li> </ul>
	<p>Innovative water policies and practices are resulting from transdisciplinary teams addressing complex water problems.</p>	<ul style="list-style-type: none"> <li>▪ Collaborative modeling in the SSRB has led to new management practices on the Bow River to mitigate the risk of floods and droughts.</li> <li>▪ Functional environmental flows are being implemented on some SSRB sub-basins to enhance the health of aquatic and riparian ecosystems.</li> <li>▪ Tailings Management Framework is being implemented.</li> <li>▪ Research addresses irrigation productivity, irrigation application efficiency, water conservation, water supply and environmental stewardship.</li> <li>▪ AEP and AGS collaboratively engaged in innovative integration of geological mapping, groundwater mapping and groundwater modeling for water management.</li> <li>▪ Water reuse project entering into policy development phase.</li> </ul>



## Innovation Platforms (IP)

Technological and organizational environments are conducive to discovery and application, fueling innovation in Alberta's water resource system.

### Innovation Platforms - Key highlights:

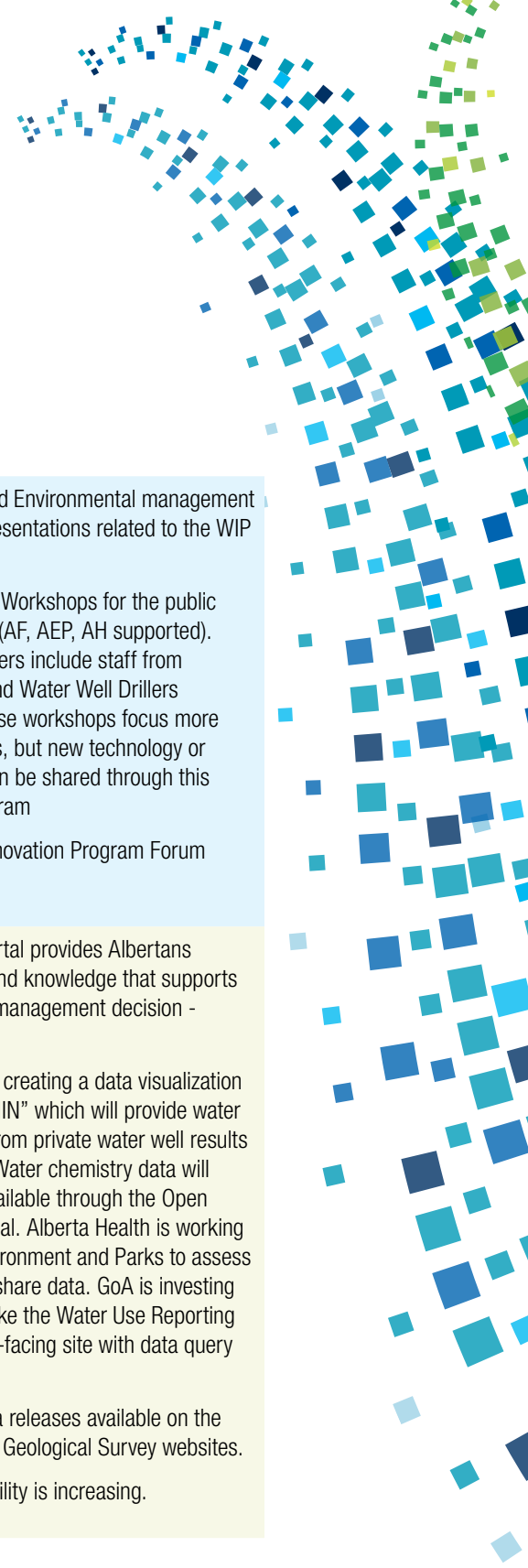
GoA also supports acquisition of equipment and large research infrastructure to build capacity in Campus Alberta institutions and support multidisciplinary teams of researchers undertaking water-related research programs.

- In 2014-2015, AEDT committed \$2.2M for water-related research projects (total projects cost \$5.6M). Out of this, AEDT made a total investment of \$1.7M in 2015. Canada Foundation of Innovation (CFI) supported these projects with a total investment of \$2.2M. Approximately 20% of the remaining investment was sourced from vendors (as in-kind contributions), start-up funds and other sources (external, industry, private).
- 14 institutions received investments from the water-related grants including WIP, comprising a total commitment of \$20M.
- Development of a data visualization tool called the Alberta Environmental Public Health Information Network (AEPHIN) that will share water chemistry data from private water well results with the public.
- Advancing Canadian Wastewater Assets (ACWA) was launched in the Spring 2015. The ACWA Research Facility is embedded in the City of Calgary's Pine Creek Wastewater Treatment Centre and bridges the gap between bench/pilot-scale testing and applications used in full-scale municipal wastewater treatment plants. The key focus of the research is development of technologies to remove emerging chemicals (notably pharmaceuticals, hormones and antibiotics) as well as pathogens and toxins from wastewaters, and to create a deeper understanding of the impacts of pollutants on aquatic environments. ACWA is an initiative under the Urban Alliance, and was established through a partnership between the University of Calgary, the City of Calgary, the Government of Alberta and the Government of Canada with total funding of more than \$38M.

**Table 2: Summary of the results achieved under outcome “Innovation Platforms”**

Actions	Indicators	Results
<p><b>IP-1</b> Maintain and enhance critical provincial innovation infrastructure that supports leading-edge water research and innovation.</p>	<p>All role in maintaining and enhancing water innovation infrastructure in Alberta</p>	<ul style="list-style-type: none"> <li>14 institutions received funding to support innovation infrastructure in Alberta and elsewhere, including University of Alberta (U of A), University of Calgary (U of C), University of Lethbridge (U of L), Northern Alberta Institute of Technology (NAIT) and AITF.</li> <li>Alberta Centre for Toxicology is part of the public health laboratory network in Alberta. This lab is funded to conduct routine (drinking and recreational) water monitoring as well as cutting edge research (cytotoxicity program). The funding includes infrastructure for laboratory equipment and space at the University of Calgary.</li> <li>Water for Life funding provided annually to CARI to maintain expertise, laboratory methodology to assess arsenic in different media including water, fish and soil.</li> </ul>
	<p>All GoA investment in innovation infrastructure</p>	<ul style="list-style-type: none"> <li>AEDT made a total investment of \$1.7M in 2015 for water-related research projects directly.</li> </ul>
	<p>PSIs – inventory of water related infrastructure</p>	
<p><b>IP-2</b> Support timely, affordable access and use of existing research infrastructure and commercialization capacity in Alberta and other jurisdictions.</p>	<p>Investments in WIP projects leverage existing research infrastructure and capacity</p>	<ul style="list-style-type: none"> <li>14 institutions received investments from the water-related grants including WIP, comprising a total commitment of \$20M.</li> </ul>
	<p>Access and use of Post-secondary and AI research infrastructure</p>	





**IP-3** Foster pan-Alberta knowledge and action networks and communities of practice to share evidence-based information, activities and best practices.

Annual forums/conferences, workshops that bring the community together

- AI-EES Water and Environmental management staff gave 25 presentations related to the WIP portfolio.
- 11 Working Well Workshops for the public were conducted (AF, AEP, AH supported). Workshop speakers include staff from AF, AEP, AHS, and Water Well Drillers Association. These workshops focus more on best practices, but new technology or information is/can be shared through this established program
- AI-EES Water Innovation Program Forum (May, 2015).

**IP-4** Improve access to water data and information to enable research in areas of strategic priority

AEP and AER coordinate data management so that public data is available through respective web portals (e.g., Oil Sands Information Portal (OSIP), Alberta Environmental Monitoring, Evaluation & Reporting Information Service (AEMERIS), WaterPortal, Water Use Reporting System (WURS)

- Alberta WaterPortal provides Albertans access to data and knowledge that supports improved water management decision - making.
- Alberta Health is creating a data visualization tool called 'AEPHIN" which will provide water chemistry data from private water well results with the public. Water chemistry data will also be made available through the Open Government Portal. Alberta Health is working with Alberta Environment and Parks to assess data needs and share data. GoA is investing \$100,000 to make the Water Use Reporting System, a public-facing site with data query tool.
- Reports and data releases available on the AER and Alberta Geological Survey websites.
- AEP data availability is increasing.



## Innovation Capacity (IC):

Water research (knowledge generators) and receptor (knowledge users) capacity enables knowledge to be effectively mobilized to create innovative solutions to Alberta's water resource system.

Assessment of this outcome is dependent on the effective mobilization of water research knowledge for the creation of innovative solutions to provincial water-related challenges.

### Innovation Capacity - Key highlights:

- World-renowned experts were recruited and retained at University of Alberta. AAF provided support to retain and develop water quality expertise and crop/water modeling expertise that supports irrigated agriculture in the province.
- Advanced Technology for water-oil separation is now being commercially demonstrated in heavy oil and SAGD facilities in Alberta.
- Researchers implemented routine use of a new assay for detecting the common cyanobacterial toxin microcystin and are currently developing new tools to assessing recreational water quality.
- Alberta's publicly-funded post-secondary institutions are currently offering more than 40 programs which are focused on water-related topics. These programs are categorized by Graduate studies, Bachelor's degree, Diploma and Certificate offered by different institutions. Following graphs are representing the number of academic programs and number of enrolments offered by various institutions.

Figure 3: Number of academic programs (water-related) offered by various Institutions (data provided by Advanced Education)

Number of Water-Related Academic Programs (<40)

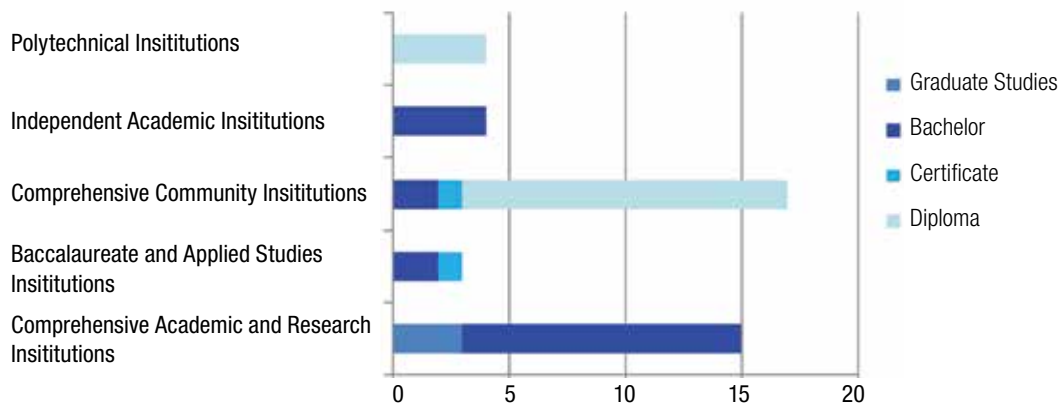
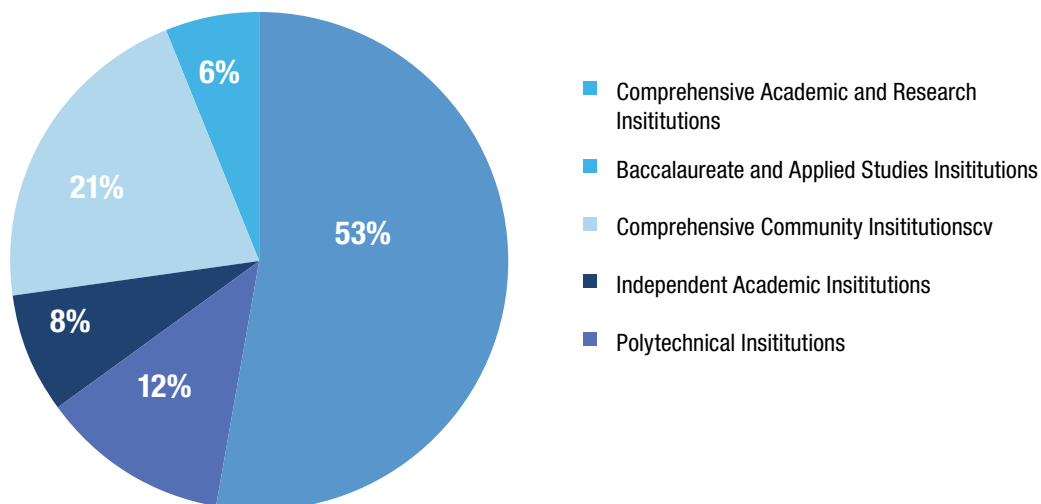
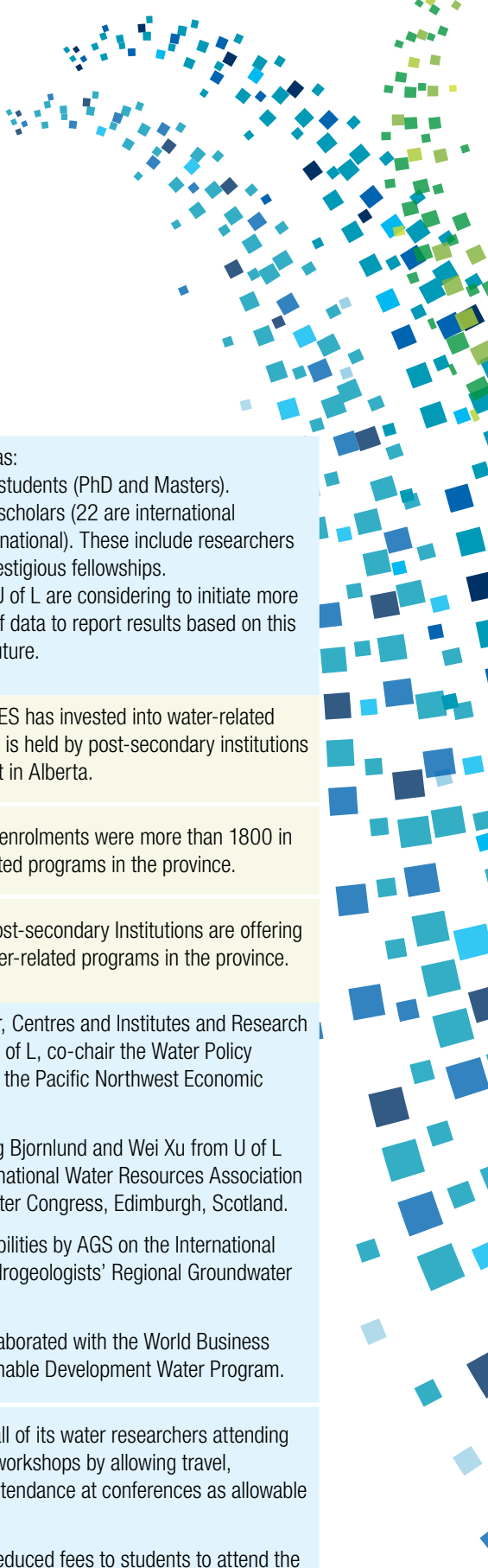


Figure 4: Number of enrolments (in water-related programs) offered by various Institutions (data provided by Advanced Education)



**Table 3: Summary of the results achieved under outcome “Innovation Capacity”**

Actions	Indicators	Results
<p><b>IC-1</b> Recruit and retain researchers and practitioners in water-related sciences and applications, with specific emphasis on advancing trans-disciplinary environmental science.</p>	<p>Leading water related scientists are recruited and retained in Alberta. WIP provides investment resources to support the outcome</p>	<ul style="list-style-type: none"> <li>▪ Supported the recruitment of world-renowned metals-in-environment expert to University of Alberta from Germany, who has established a world-class clean lab.</li> <li>▪ Retained leading expert in arsenic who conducts research, teaches and collaborates with US EPA (Environmental Protection Agency) on arsenic.</li> <li>▪ Retaining and developing water quality expertise and crop/water modeling expertise that supports irrigated agriculture.</li> </ul>
	<p>GoA and GoC invest in water related researchers (chairs)</p>	<ul style="list-style-type: none"> <li>▪ International acclaimed expert was recruited to Alberta Innovates – Health Solutions (AIHS) Translational Chair at the University of Alberta in 2014.</li> <li>▪ Chair in Oil Sands Tailings Geotechnique</li> <li>▪ Chair in Oil Sands Tailings Water Treatment</li> </ul>
	<p>University water related researchers</p>	<ul style="list-style-type: none"> <li>▪ Number of researchers and research affiliates in various faculties currently working on Water-related projects are as follows (data provided by University representatives):                             <ul style="list-style-type: none"> <li>- U of A ~ 80 researchers (in 8 faculties)</li> <li>- U of C ~ 52 (in 8 faculties)</li> <li>- U of L ~ 39 researchers; 25 research affiliates (in 8 faculties)</li> </ul> </li> </ul>
	<p>Graduate students and postdocs employed in environmental science sector in Alberta and other provinces</p>	<ul style="list-style-type: none"> <li>▪ WaterSMART supported one Ph.D in water treatment; one and two M.Sc. students in Environmental engineering and in Water resources respectively.</li> <li>▪ Mitacs’s <i>Accelerate and Elevate</i> internship programs for water-related research in Alberta (province-funded) for the period of December 2014 – December 2015 (data provided by Mitacs).                             <ul style="list-style-type: none"> <li>- Province contributed \$120,000 that supported eight interns.</li> </ul> </li> <li>▪ Mitacs’s <i>Globalink</i> internships program offered 14 internships in water-related research.                             <ul style="list-style-type: none"> <li>- Province contributed approximately \$70,000 that supported 14 interns.</li> </ul> </li> </ul>



		<ul style="list-style-type: none"> <li>U of C currently has:             <ul style="list-style-type: none"> <li>~260 graduate students (PhD and Masters).</li> <li>33 postdoctoral scholars (22 are international scholars, 11 are national). These include researchers awarded with prestigious fellowships.</li> </ul> </li> <li><b>Note:</b> U of A and U of L are considering to initiate more formal collection of data to report results based on this indicator in near future.</li> </ul>
<p><b>IC-2</b> Develop appropriate post-secondary trans-disciplinary programs to produce graduates that have the necessary skill sets to work in complex water resource environments</p>	<p>GOA post -secondary investment in water related programming</p>	<ul style="list-style-type: none"> <li>Of the \$25M AI-EES has invested into water-related innovation, \$9.6M is held by post-secondary institutions with \$8.7M of that in Alberta.</li> </ul>
	<p>Grad students</p>	<ul style="list-style-type: none"> <li>A total number of enrolments were more than 1800 in various water-related programs in the province.</li> </ul>
	<p>PSI programs</p>	<ul style="list-style-type: none"> <li>Publicly-funded post-secondary Institutions are offering more than 40 water-related programs in the province.</li> </ul>
<p><b>IC-3</b> Encourage Alberta researchers and technology development organizations to be engaged in relevant national and global water-related networks</p>	<p>Alberta’s research and innovation community communicate with and collaborate with national and international water related innovation networks, water conferences</p>	<ul style="list-style-type: none"> <li>David Hill, Director, Centres and Institutes and Research Advocacy (CIRA), U of L, co-chair the Water Policy Working group for the Pacific Northwest Economic Region (PNWER).</li> <li>David Hill, Henning Bjornlund and Wei Xu from U of L presented at International Water Resources Association (IWRA), World Water Congress, Edimburgh, Scotland.</li> <li>Co-chair responsibilities by AGS on the International Association of Hydrogeologists’ Regional Groundwater Flow Commission.</li> <li>WaterSMART collaborated with the World Business Council for Sustainable Development Water Program.</li> </ul>
	<p>Incentives are available to enable researchers and/ organizations to be engaged in networks, conferences, etc.</p>	<ul style="list-style-type: none"> <li>AI-EES supports all of its water researchers attending conferences and workshops by allowing travel, registration and attendance at conferences as allowable grant expenses.</li> <li>AI-EES provides reduced fees to students to attend the bi-annual COSIA-AI-EES water conference.</li> </ul>



**IC-4** Accelerate the movement of discoveries and new applications into practice, commercial products and services by enhancing receptor capacity in industry and government

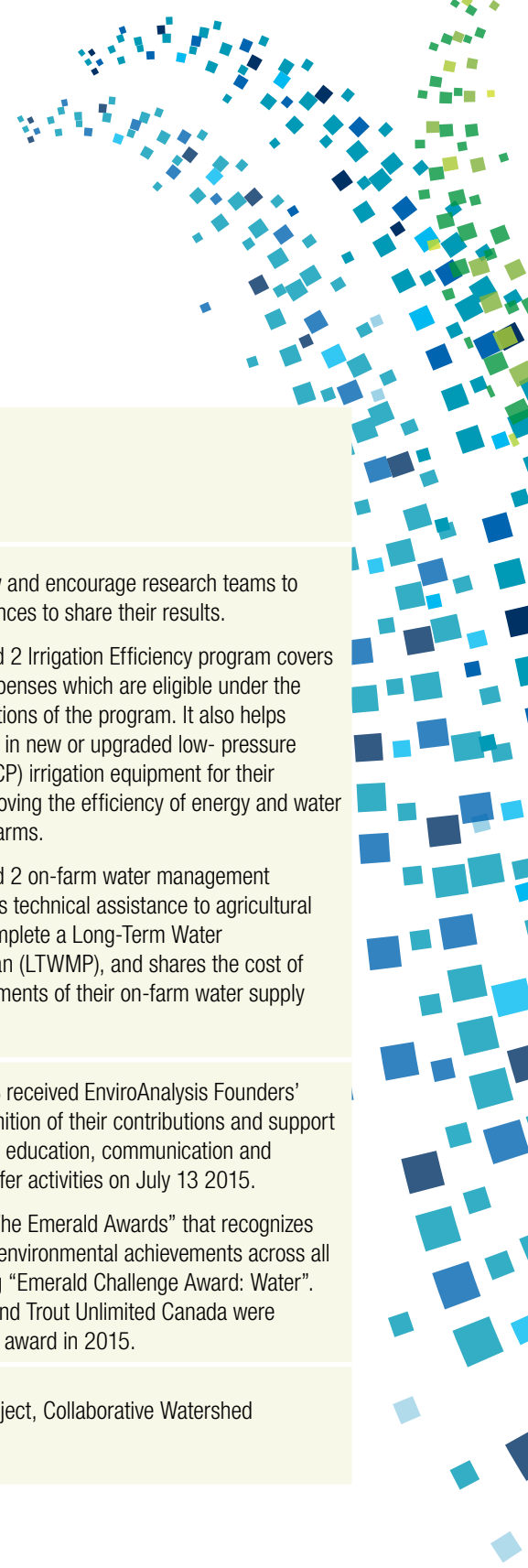
Examples of technology deployment in industry

- Previously supported pilot development and application of oil sands water treatment technology which provides for effective water-oil separation including higher temperature and pressure water treatment that is now being demonstrated in heavy oil and SAGD facilities in Alberta.
- WIP has supported moving tailings treatment technologies from proof of concept scales to field base pilot trials.
- Revising the recreational water management program and introducing new technologies to assess toxins.
- Detection tools for Swimmer's itch are being developed and used by Alberta Health Services when assessing risk at recreational sites.

Research, technology, and applications have been translated into policy implementations in government

- Enhancing Accessibility and use of Alberta's Natural Water Recreation Areas through Prevention of Swimmer's Itch Transmission – Alberta Health has changed their guidelines in response to the information which has come from this research.
- Sustainable Urban Water Management in the Context of Climate Variability and Change – The City of Calgary and EPCOR have changed their risk management and mitigation plans in response to the information on long-term water supply and variability which comes from this research.
- Functional environmental flows – Dam operators in Alberta are managing extreme flows differently as they now recognize the aquatic and riparian ecosystems health benefits which can be realized with minimal cost to their operations.
- Climate Vulnerability and Sustainable Water Management in the SSRB – Dam operators in the Bow River basin are now managing spring flows recognizing that risk of flood and drought can be mitigated with less cost to summer and fall flows than previously assumed.





Public engagement/  
conferences have increased  
the movement of discovery  
to application

Incentives (such as grants  
and grant renewals) are  
in place and facilitate  
the adoption of new  
technologies

- WIP grants allow and encourage research teams to travel to conferences to share their results.
- Growing Forward 2 Irrigation Efficiency program covers travel-related expenses which are eligible under the terms and conditions of the program. It also helps producers invest in new or upgraded low- pressure centre pivot (LPCP) irrigation equipment for their operations, improving the efficiency of energy and water use on Alberta farms.
- Growing Forward 2 on-farm water management program provides technical assistance to agricultural producers to complete a Long-Term Water Management Plan (LTWMP), and shares the cost of related enhancements of their on-farm water supply management.

Research & researchers are  
being recognized and/or  
receiving awards

- AITF and AI-EES received EnviroAnalysis Founders' awards in recognition of their contributions and support of environmental education, communication and technology transfer activities on July 13 2015.
- GoA supports "The Emerald Awards" that recognizes the outstanding environmental achievements across all sectors including "Emerald Challenge Award: Water". Nature Alberta and Trout Unlimited Canada were recipients of this award in 2015.

Evidence based policy  
development with input  
from scientist

- Water Reuse project, Collaborative Watershed Management

## Summary

This report captures the successes, challenges, gaps and opportunities related to AWRIS initiatives. With respect to the implementation of AWRIS, progress is occurring within organizations through new and existing programs and initiatives intended to improve the water research and innovation system. Organizations are developing partnerships, sharing resources and creating opportunities to advance innovation in the province.

Alberta has a clear framework for future success and it is anticipated that progress will occur with increasing speed. The impact of synergies and partnering will be experienced by water-related stakeholders as a result of their contributions in this area. AWRIS is fostering new opportunities to provide improved and effective water related outcomes for Albertans. Provincial investments in water research and innovation systems create relevant, reliable and credible knowledge which result in progressive change in Alberta.

Mechanisms supporting the engagement of government, academia and industry are in place. Alberta's Comprehensive Academic and Research Institutions play a key role in building research capacity and maintaining a resilient base of research strengths contributing to the economic, environmental and social priorities of the province.

This report reflects how investments were made to support the strategic needs of the water resource system in Alberta. Several ongoing projects are employing transdisciplinary approaches that have resulted in the development of new and innovative water policies and practices. AEDT, AEP and AI-EES support water innovation infrastructure in the province. Albertans have a variety of mechanism to access water data and information through web portals. These web portals play a key role in engaging Albertans, spreading awareness about the water-related issues and identifying gaps and challenges in the water resource system.

Data was collected from various organizations. Each organization has different systems for collecting and reporting data. In order to monitor province-wide growth and development of the water sector, efforts will continue to develop improved systems for data collection and normalization. Alberta will exploit strategic approaches for the water-related research data collection and management. Indicators listed in the strategy's reporting system also open a new avenue to collect information from different stakeholders in a consistent way. Future reporting will benefit from new and improved data sources.

# Appendix: AWRIS Evaluation Framework

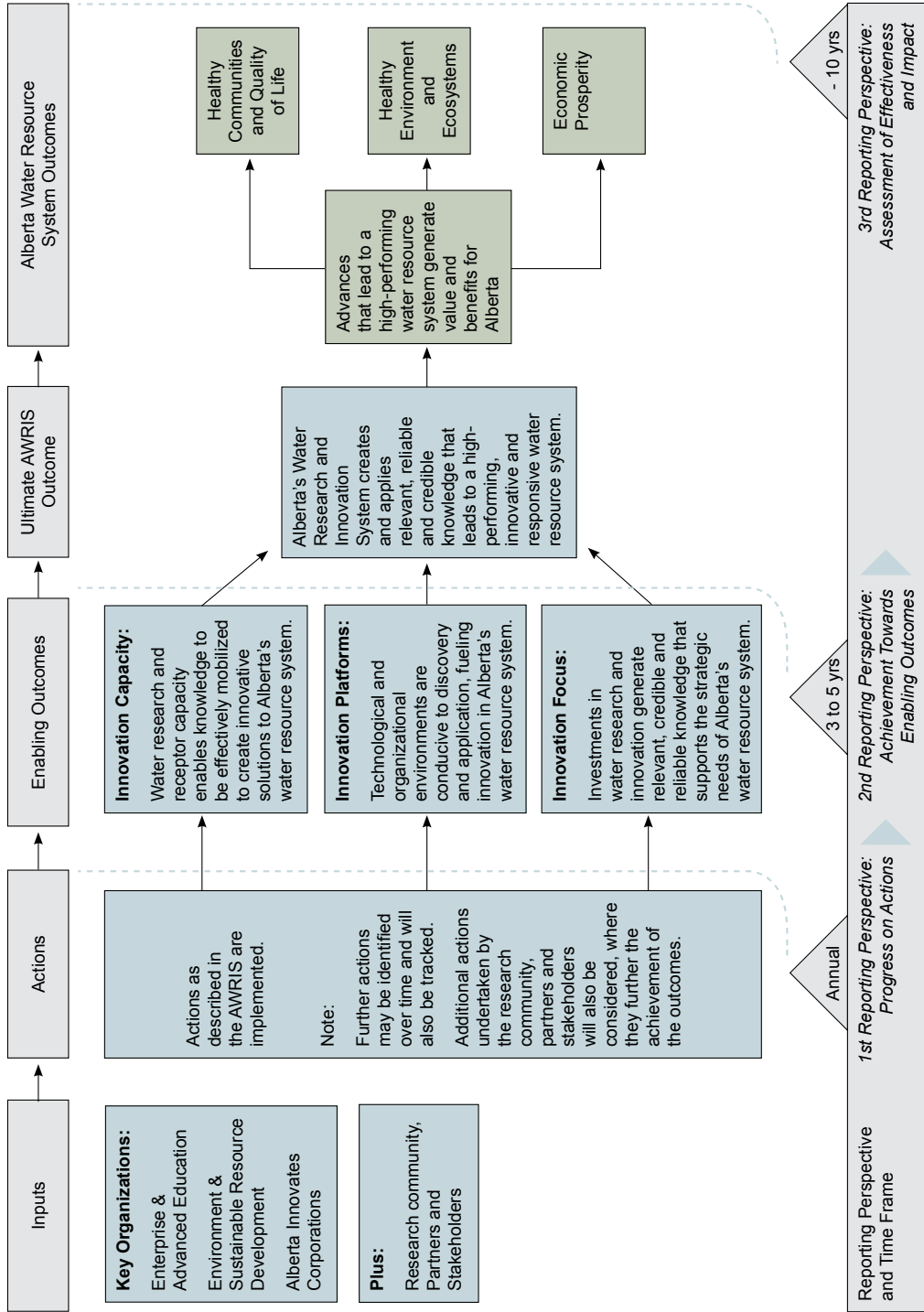


Figure 3  
An evaluation framework for measuring progress and assessing impact of the Alberta Water Research and Innovation Strategy 2014: A Renewal. Results from previous reporting perspectives inform the subsequent reporting perspective.

## Definition of acronyms

AAF – Alberta Agriculture and Forestry

ACWA – Advancing Canadian Wastewater Assets

AEDT – Alberta Economic Development and Trade

AEMERIS - Alberta Environmental Monitoring, Evaluation & Reporting Information Service

AEP – Alberta Environment and Parks

AER – Alberta Energy Regulator

AGS – Alberta Geological Survey

AH – Alberta Health

AIHS – Alberta Innovates – Health Solutions

AI-EES – Alberta Innovates– Energy and Environment Solutions

AITF – Alberta Innovates – Technology Futures

AEPHIN – Alberta Environmental Public Health Information Network

AWC - Alberta Water Council

AWRIS – Alberta’s Water Research and Innovation Strategy 2014: A Renewal

CFI - Canada Foundation of Innovation

COSIA - Canada’s Oil Sands Innovation Alliance

CUSR – Canadian Society for Unconventional Resources

CWN – Canadian Water Network

GoA – Government of Alberta

HQP – Highly Qualified Personnel

IDM – Irrigation Water Demand Model

IWRA – International Water Resources Association

LPCP – Low Pressure Centre Pivot

LTWMP – Long-Term Water Management Plan

MOU – Memorandum of Understanding

NRCan – Natural Resources Canada

OSIP – Oil Sands Information Portal

PNWER – Pacific Northwest Economic Region

SAGD – Steam-Assisted Gravity Drainage

SSRB – South Saskatchewan River Basin

WIP – Water Innovation Program

WTDC - Water Technology Demonstration Centre

WURS – Water Use Reporting System

US EPA - US Environmental Protection Agency

## List of Contributing Organizations

### Government of Alberta ministries and agencies:

Alberta Advanced Education  
Alberta Agriculture and Forestry  
Alberta Energy Regulator  
Alberta Environment and Parks  
Alberta Geological Survey  
Alberta Health  
Alberta Innovates-Energy and Environment Solutions  
Alberta Water Council

### Post-secondary institutions

University of Alberta  
University of Calgary  
University of Lethbridge

### Industry:

Alberta Irrigation Projects Association

### Not-for-profit organization:

Mitacs

### Other organizations:

Alberta WaterSMART  
Foothills Research Institute

## References

1. Water for Life: Alberta's strategy for sustainability, 2003  
<http://aep.alberta.ca/water/programs-and-services/water-for-life/strategy/documents/WaterForLife-Strategy-Nov2003.pdf>
2. Water Research Strategy, 2006  
[http://bio.albertainnovates.ca/media/67688/2006\\_asra\\_water\\_strategy.pdf](http://bio.albertainnovates.ca/media/67688/2006_asra_water_strategy.pdf)
3. Water for Life: a Renewal, 2008  
<http://environment.gov.ab.ca/info/library/8035.pdf>
4. Alberta's Water Research and Innovation Strategy 2014: A Renewal, 2014  
<http://iae.alberta.ca/media/427167/ab%20water%20research%20innovation%20strategy%202014.pdf>
5. AI-EES - Water Innovation Program  
[http://www.ai-ees.ca/wp-content/uploads/2016/03/ai-ees\\_wip\\_book\\_june\\_2015\\_final\\_web.pdf](http://www.ai-ees.ca/wp-content/uploads/2016/03/ai-ees_wip_book_june_2015_final_web.pdf)
6. Alberta's Irrigation: A Strategy for the future, 2014  
[http://www1.agric.gov.ab.ca/\\$Department/deptdocs.nsf/all/irr14885/\\$FILE/alta\\_irrig\\_strategy\\_measures\\_2014\\_15.pdf](http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/irr14885/$FILE/alta_irrig_strategy_measures_2014_15.pdf)
7. Our Water, Our Future: A Plan for Action 2014  
<http://esrd.alberta.ca/water/water-conversation/documents/WaterFuture-PlanAction-Nov2014A.pdf>
8. Mitacs Annual Report to Alberta Innovates Technology Futures, April2014 – March 2015.

Alberta   
Canada 

