

## Theme 3

# Tools for integration in watershed management and governance

Margot Parkes, Scott Emmons and team\*

### Areas of inquiry:

- 1) How can we benefit from new technologies and tools to support integrated learning, understanding and decision-making in the watershed.
- 2) How can we best design a tool (e.g., watershed portal) to bring together and share existing knowledge and exchange new watershed research in the Nechako?



## Theme 3



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- 2) How can we best design a tool (e.g., watershed portal) to bring together and share existing knowledge and exchange new watershed research in the Nechako?

# A web-based portal refined in the Nechako



- **Web-based** platform
- **Geospatial** means by which to store, search and access information
  - *“A geospatial library”?*
- **Open-source**, designed in northern BC, adapted to Nechako context /users
- **Expansion of options** for users and data-entry
- **User-group** oriented
  - *“like Google earth, but different”*

## A web-based portal refined in the Nechako

### Established Portal User Groups (Phase I)

- **IWRG**: from mapping and describing to bulk-loading existing knowledge...
- **CCN/Cheslatta Carrier Nation**:  
Archive & share
- **NEWSS: (Nechako Environment Water Stewardship Society)**  
Sharing and profiling stewardship initiatives
- **SD91**: School-kids engagement in monitoring (Pacific Streamkeepers)

- **Web-based** platform
- **Geospatial** means by which to store, search and access information
  - “A geospatial library”?
- **Open-source**, designed in northern BC, adapted to Nechako context /users
- **Expansion of options** for users and data-entry
- **User-group** oriented  
“like Google earth, but different”

# A web-based portal refined in the Nechako

The screenshot displays a web browser window titled "Stewardship Portal". The page header features the UNBC logo (University of Northern British Columbia) on the left and the title "Integrated Watershed Research Group Portal" in the center. A green navigation bar contains buttons for "Fill a Form", "Search", "Reports", "Map Tools", "Links", "Dashboard 0", and "Logout". A timer in the top right corner shows "22 minutes remaining".

The main content area is a map of the Nechako Watershed, highlighted in green. The map includes labels for "Terrace", "Kitimat", and "Prince George". A legend on the right side of the map shows the following layers:

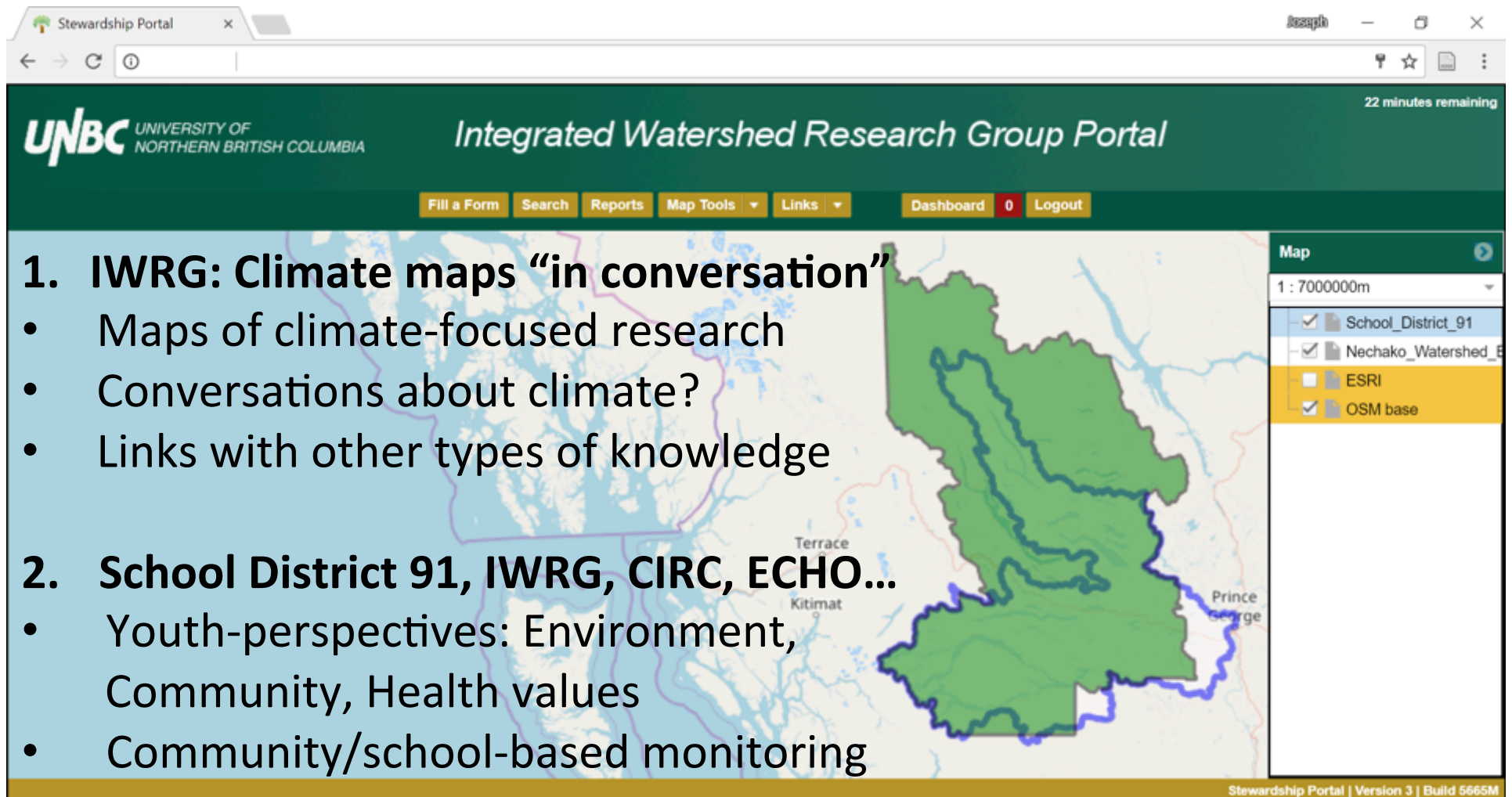
- School\_District\_91
- Nechako\_Watershed\_E
- ESRI
- OSM base

The map scale is set to 1 : 7000000m. The footer of the page reads "Stewardship Portal | Version 3 | Build 5665M".

# A web-based portal refined in the Nechako

The screenshot displays the 'Stewardship Portal' interface. At the top, a navigation bar includes links for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard 0', and 'Logout'. A '22 minutes remaining' timer is visible in the top right corner. The main content area features a large map of the Nechako watershed, outlined in green, with labels for Terrace, Kitimat, and Prince George. A legend on the left side of the map identifies 'Settlements' (First Nations communities, Major city, Smaller towns, Incorporated villages) and 'Elevation' (Max: 2569 m a.s.l., Min: 550 m a.s.l.). Below the map, a 'Maximum temperature Trends 1950-2010' chart shows a color-coded map of the region, with a legend indicating a trend of  $^{\circ}\text{C}/\text{decade}^{-1}$  ranging from 0.2 to 0.3. The chart axes are Latitude ( $^{\circ}\text{N}$ ) and Longitude ( $^{\circ}\text{W}$ ). A 'Map' panel on the right side of the interface shows a scale of 1:7000000m and a legend with checked items for 'School\_District\_91', 'Nechako\_Watershed\_B', 'ESRI', and 'OSM base'. The bottom right corner of the interface displays 'Stewardship Portal | Version 3 | Build 5665M'.

# A web-based portal refined in the Nechako



Stewardship Portal

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Integrated Watershed Research Group Portal

22 minutes remaining

Fill a Form Search Reports Map Tools Links Dashboard 0 Logout

1. **IWRG: Climate maps “in conversation”**

- Maps of climate-focused research
- Conversations about climate?
- Links with other types of knowledge

2. **School District 91, IWRG, CIRC, ECHO...**

- Youth-perspectives: Environment, Community, Health values
- Community/school-based monitoring

Map

1 : 7000000m

- School\_District\_91
- Nechako\_Watershed\_E
- ESRI
- OSM base

Terrace  
Kitimat  
Prince George

Stewardship Portal | Version 3 | Build 5665M

# A web-based portal refined in the Nechako

Student example: “Climate change implications for ecosystems and well-being: developing effective geospatial knowledge exchange tools in the Nechako Watershed”

The screenshot displays a web browser window titled "Stewardship Portal" with a user named "Joseph". The page header features the UNBC logo and the title "Integrated Watershed Research Group Portal". A navigation bar includes buttons for "Fill a Form", "Search", "Reports", "Map Tools", "Links", "Dashboard 0", and "Logout". A timer in the top right corner shows "12 minutes remaining". The main content area is a map of the Nechako Watershed, with a color-coded overlay ranging from yellow to red. The map includes labels for "Prince of Wales Island", "Revillagigedo Island", "Ketchikan", "Kitsault", "Terrace", "Kitimat", "Princess", and "Graham Island". A legend on the right side of the map shows a scale of "1 : 5000000m" and a list of layers: "Fort St. James", "Trend", "Nechako\_Watershed\_E", "ESRI", and "OSM base". The "ESRI" layer is currently selected and highlighted in yellow. The bottom right corner of the map area displays "Stewardship Portal | Version 3 | Build 5665M".



# A web-based portal refined in the Nechako

The screenshot displays a web browser window with the URL 'Stewardship Portal'. The page header features the UNBC logo and the title 'Integrated Watershed Research Group Portal'. A navigation bar includes buttons for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard' (with a '0' notification), and 'Logout'. The main content area is split into two panels. The left panel, titled 'Submission Details: ID: 225 - Generic\_2 - admin', contains a sidebar with options like 'General', 'Preview', 'Allowed Users', 'Spatial Data', 'Attachments', 'Child Submissions', 'History', and 'Export'. The main form area shows 'Submission Name' with fields for 'Title: ID: 225 - Generic\_2 - admin' and 'Name: Amendment to Climate submission'. Below this is a 'Parent Submission' section with a 'Help' dropdown and 'Parent Submission: ID: 44 - IWRG\_General\_Use - admin'. A 'Dynamic Content' section contains a text area with the text: 'Adding a point to represent where the conversation with Dr. Stephen Déry about climate change occurred.' The right panel shows a map of the Nechako watershed with a color gradient from yellow to red. A legend on the right side of the map includes layers for 'Fort', 'Tren', 'Nec', 'ESF', and 'OSM', with checkboxes for each. The map scale is indicated as '1 : 5000000m'. The browser's address bar and user name 'Joseph' are visible at the top.

# A web-based portal refined in the Nechako

The screenshot displays the 'Stewardship Portal' for the University of Northern British Columbia (UNBC). The page title is 'Integrated Watershed Research Group Portal'. The navigation menu includes 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard' (with a '0' notification), and 'Logout'. The user 'Joseph' is logged in.

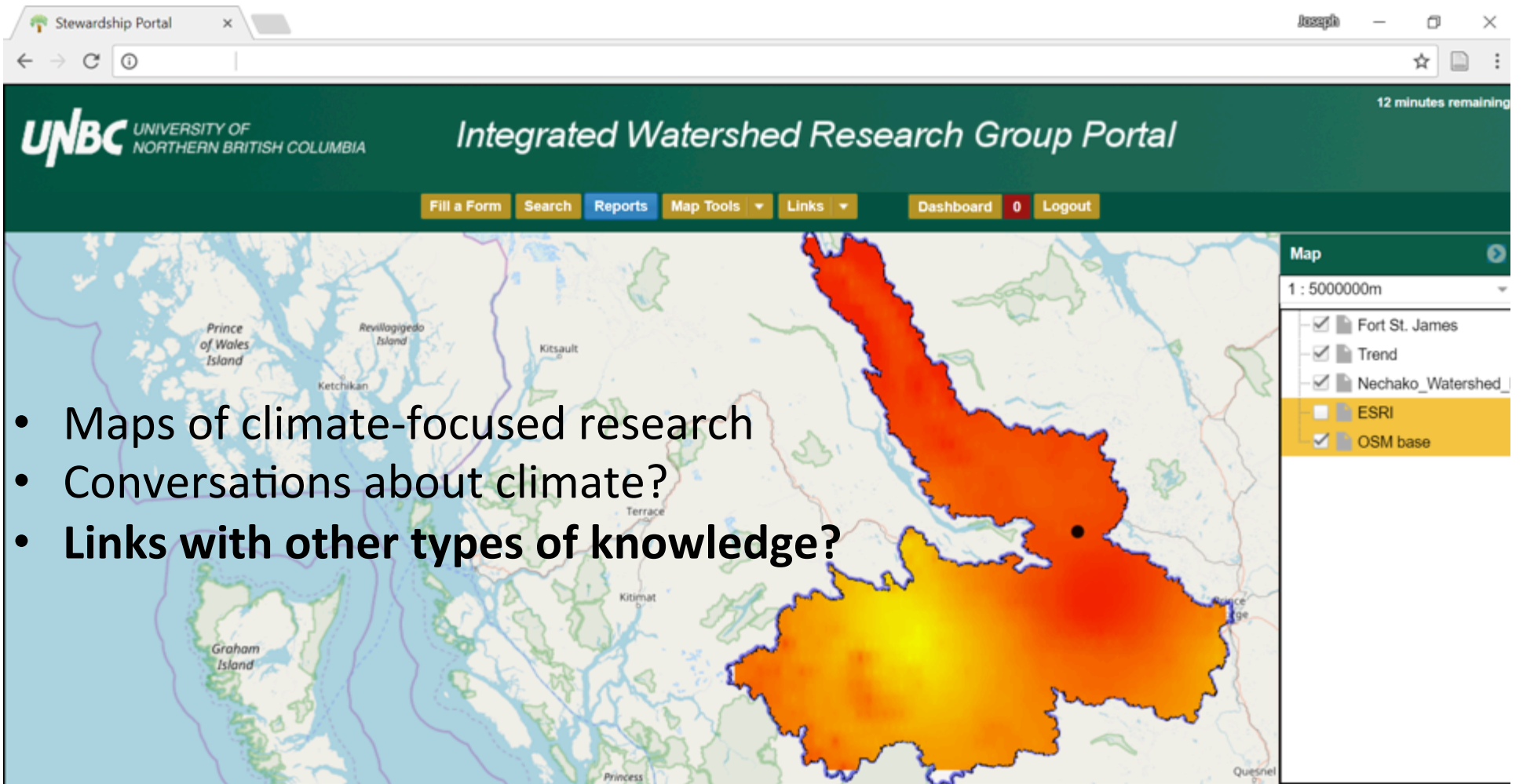
The main content area is split into two panels. The left panel, titled 'Submission Details: ID: 225 - Generic\_2 - admin', contains a sidebar with options like 'General', 'Preview', 'Allowed Users', 'Spatial Data', 'Attachments', 'Child Submissions', 'History', and 'Export'. The main content area of this panel is titled 'Dynamic Content' and includes a text description: 'Adding a point to represent where the conversation with Dr. Stephen Déry about climate change occurred.' Below this is a section for citation information with fields for 'Title', 'Authors(s): Stephen Déry', and 'Year: 2017'. There is also a rich text editor with a toolbar and a text area containing links to Dr. Stephen Déry's UNBC profile and Northern Hydrometeorology Group website. A 'Keyword(s): Climate change' field is at the bottom.

The right panel shows a map of the Nechako watershed, colored in a gradient from yellow to red. A black dot is placed on the map. A legend on the right side of the map shows various layers: 'Fort', 'Tren', 'Nec', 'ESF', and 'OSM'. The map scale is '1 : 5000000m'.

# A web-based portal refined in the Nechako

The screenshot displays the 'Stewardship Portal' interface. At the top, the UNBC logo and 'Integrated Watershed Research Group Portal' title are visible. A navigation bar includes buttons for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard' (with a '0' indicator), and 'Logout'. The main content area features a map of the Nechako watershed, color-coded in shades of orange and red. A sidebar on the left shows 'Submission Details: ID: 225 - Generic\_2 - admin' with tabs for 'General', 'Preview', 'Allowed Users', 'Spatial Data', 'Attachments', 'Child Submissions', 'History', and 'Export'. The 'Attachments' section lists a file named 'Stephen.WAV'. The 'Spatial Layers' section includes 'Help', 'Valid Schemas', and 'Layer Name' with a 'From Map' button. A legend on the right side of the map shows various layers like 'Fort', 'Tren', 'Nec', 'ESF', and 'OSM' with checkboxes. The bottom right corner of the map area shows 'Stewardship Portal | Ver'.

# A web-based portal refined in the Nechako



The screenshot displays the 'Stewardship Portal' for the University of Northern British Columbia (UNBC). The page features a dark green header with the UNBC logo and the title 'Integrated Watershed Research Group Portal'. A navigation bar includes buttons for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard 0', and 'Logout'. The main content area shows a map of the Nechako Watershed with a color-coded overlay representing climate-focused research. The overlay is a heatmap where the central and southern parts of the watershed are colored in bright yellow and orange, while the northern parts are in a darker orange. The map also shows geographical features like Prince of Wales Island, Revillagigedo Island, Ketchikan, Terrace, Kitimat, and Princess. A legend on the right side of the map lists layers: 'Fort St. James', 'Trend', 'Nechako\_Watershed\_', 'ESRI', and 'OSM base'. The scale is set to 1:5000000m. The footer of the page includes the UNBC logo and the text 'Integrated Watershed Research Group'.

- Maps of climate-focused research
- Conversations about climate?
- **Links with other types of knowledge?**

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Integrated Watershed Research Group

# A web-based portal refined in the Nechako

From 'lists' of publications, to 'placing' knowledge in context

The screenshot shows a web browser window titled "Stewardship Portal" with a user named "Joseph". The page displays the "Integrated Watershed Research Group Portal" for UNBC (University of Northern British Columbia). A "Bulk-Loader" window is open, showing a table of publications. The table has columns for document type, source, year, author, title, publication, and abstract. The current row is highlighted in blue.

E.g. text b...	E.g. journ...	Year	Author	Title	Publicatio...	E.g. abstr...
Text Docu...	Journal Arti...	1998	Booth, An...	"Putting " f...	The Forest...	
Text Docu...	Journal Arti...	2009	Fondahl, G...	Co-Managi...	Community...	
Text Docu...	Journal Arti...	2008	Kurz, W. A...	Mountain p...	Nature	The mount...
Text Docu...	Journal Arti...	2006	Larsen, So...	The Future'...	Geografisk...	ABSTRAC...
Text Docu...	Journal Arti...	2009	Mclveen, ...	Community...	Local Envir...	Drawing on...
Text Docu...	Journal Arti...	1984	Pearse, Pe...	Of Home a...	Canadian ...	The recentl...
Text Docu...	Journal Arti...	2012	Ryser, Laur...	Resolving ...	Journal of ...	Rural and s...
Text Docu...	Journal Arti...	2012	Shrestha, ...	Modelling s...	Hydrologic...	This paper ...
Text Docu...	Journal Arti...	2012	Stevens, M...	Examining ...	Local Envir...	The provin...
Text Docu...	Journal Arti...	2004	Watson, Ni...	Integrated r...	Internation...	Abstract Int...
Text Docu...	Journal Arti...	2008	Adam, M. ...	Local level ...	Forest Ecol...	Although th...
Text Docu...	Journal Arti...	2014	Allen, D.M...	Trends in g...	Canadian ...	Les relatio...
Text Docu...	Journal Arti...	2011	Booth, Ann...	There's a C...	Society ,a...	This study ...
Text Docu...	Journal Arti...	2012	de Leeuw, ...	With Reser...	Annals of t...	Health disp...

The interface includes an "Admin Panel" on the left with options like User Manager, Group Manager, Form Manager, Schema Manager, Sharable Manager, and System Manager. A map on the right shows the location of the research group, with cities like Edmonton, Wetaskiwin, Lacombe, Red Deer, and Calgary marked. The footer indicates "Stewardship Portal | Version 3 | Build 5665M".

# A web-based portal refined in the Nechako

From 'lists' of publications, to 'placing' knowledge in context

The screenshot displays a web browser window titled "Stewardship Portal" with a user named "Joseph". The main content area features the UNBC logo and the title "Integrated Watershed Research Group Portal". A navigation bar includes buttons for "Fill a Form", "Search", "Reports", "Map Tools", "Links", "Dashboard 0", and "Logout". On the left, an "Admin Panel" lists "User Manager", "Group Manager", "Form Manager", "Schema Manager", "Sharable Manager", and "System Manager". The central map shows the Nechako watershed in blue, with numerous colored circles (green, orange, blue) representing data points. The right sidebar, titled "Map", shows a scale of 1:5000000m and a legend with checked items: "Health\_well-being", "environmentEcosystem", "communitySocialsystem", "Nechako\_Watershed\_E", "ESRI", and "OSM base". The bottom status bar reads "Stewardship Portal | Version 3 | Build 5665M".

# A web-based portal refined in the Nechako

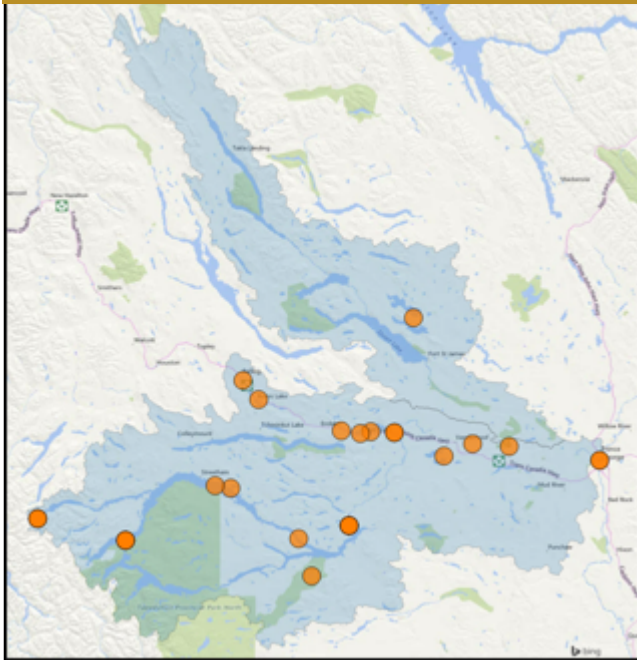


Figure 1 – 1934-1989

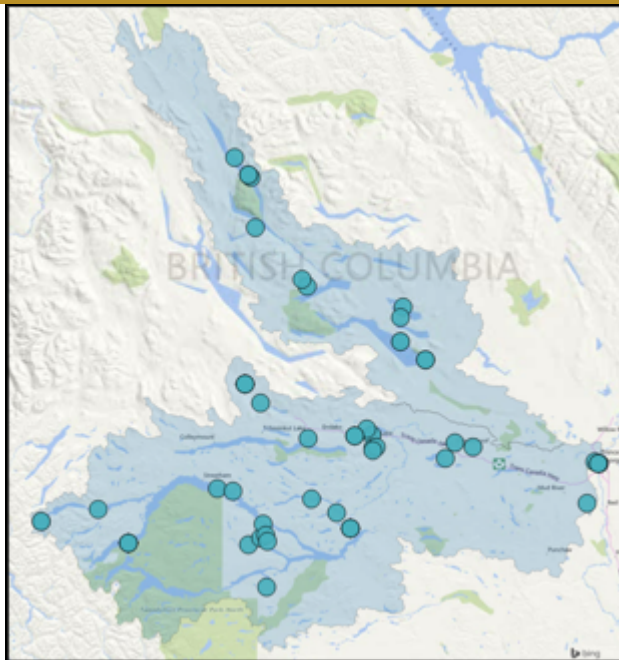


Figure 2 – 1990-2005

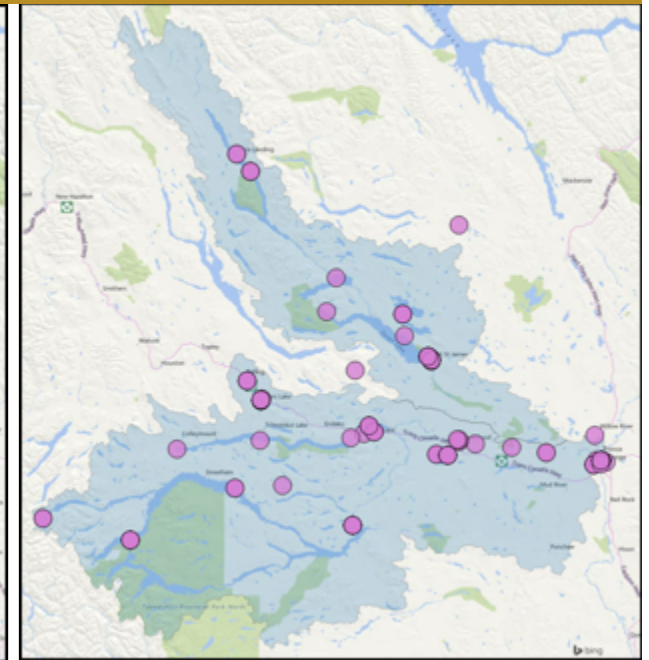
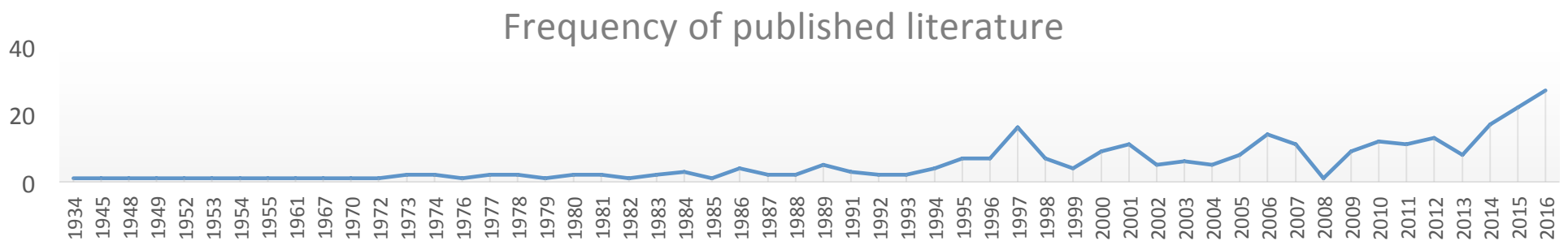
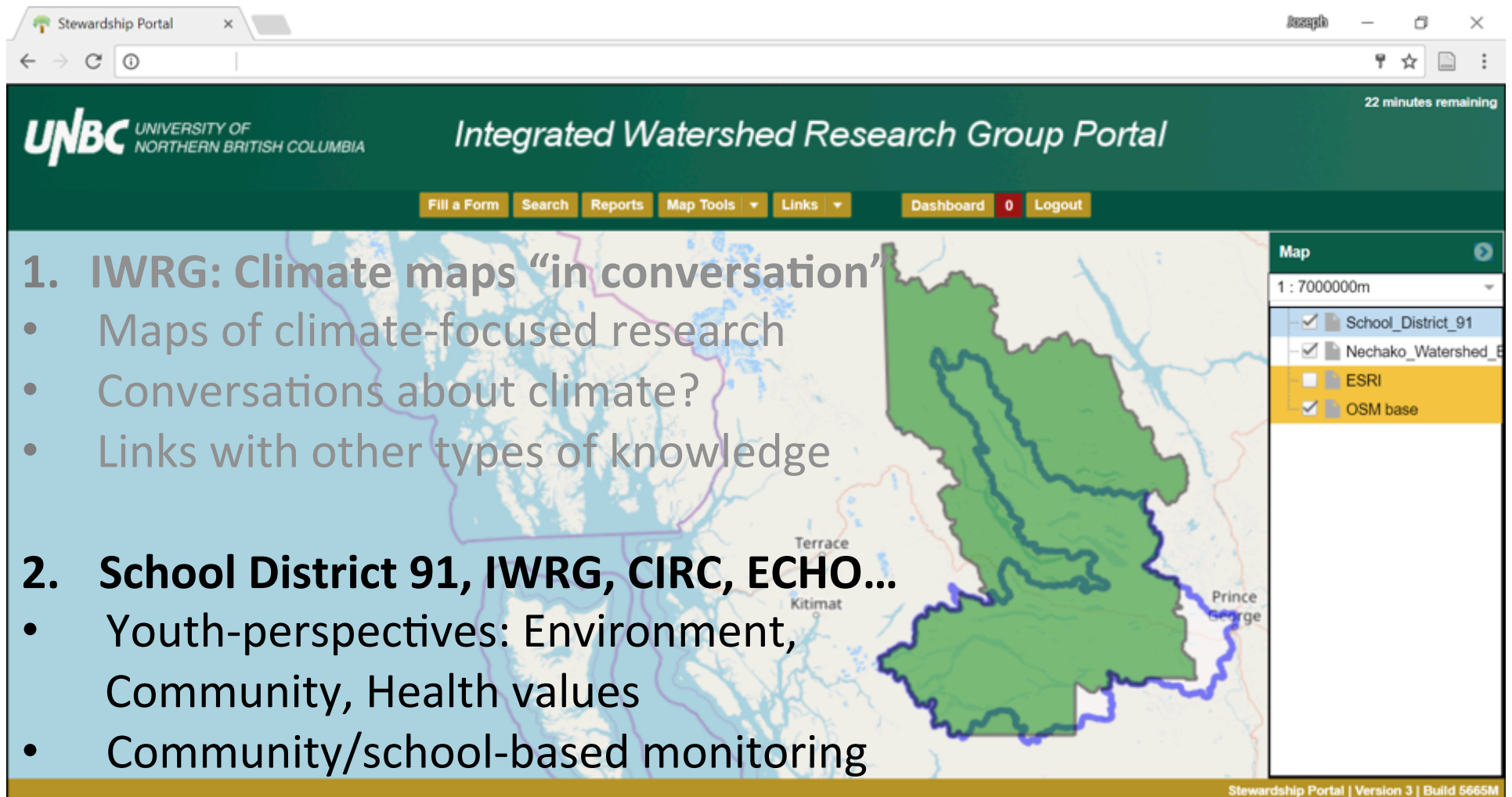


Figure 3 – 2006-2016



# A web-based portal refined in the Nechako

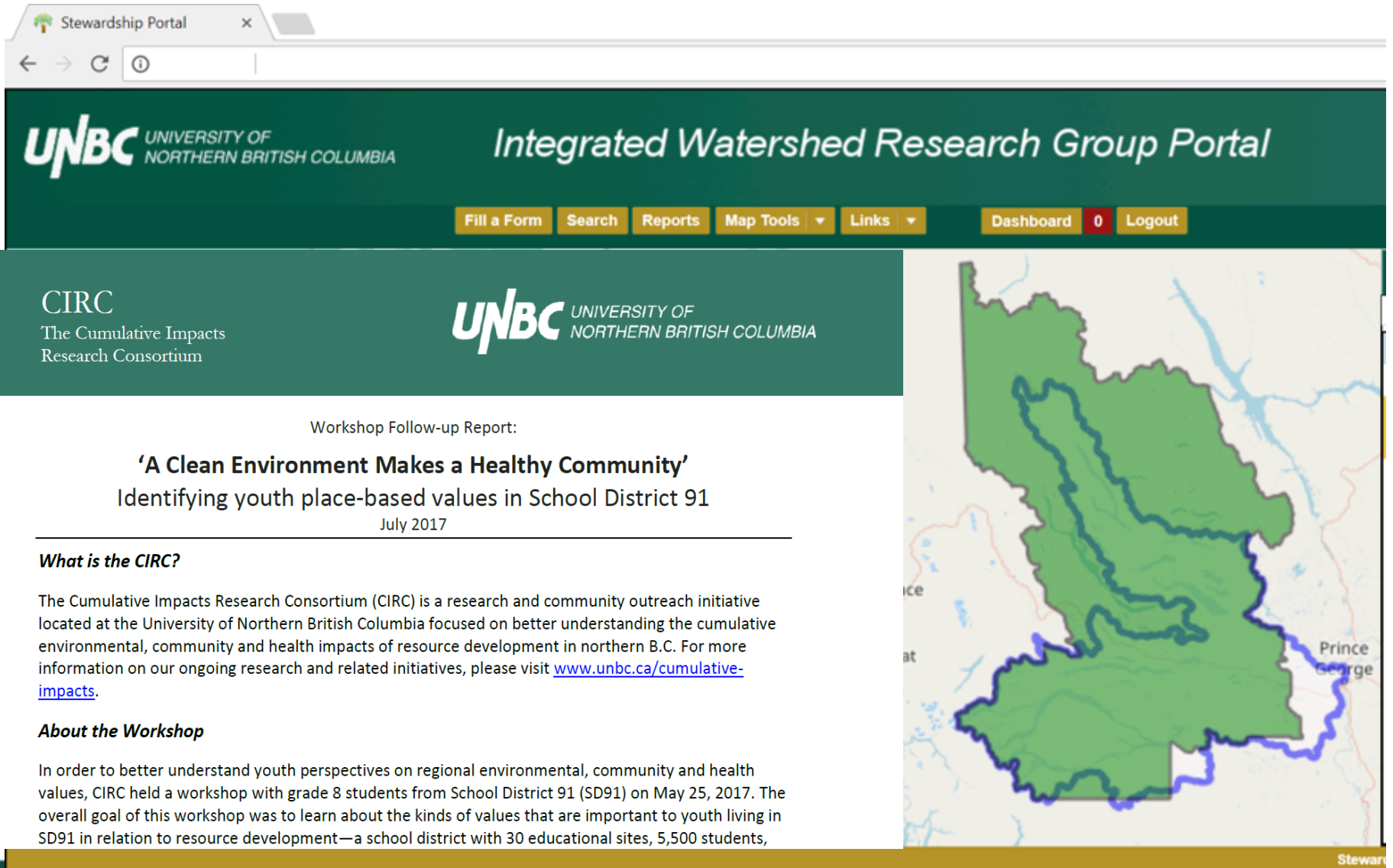


The screenshot shows a web browser window displaying the 'Stewardship Portal' for the University of Northern British Columbia. The page title is 'Integrated Watershed Research Group Portal'. The navigation menu includes 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard', and 'Logout'. A map of the Nechako Watershed is displayed, with a legend on the right side. The legend shows 'School\_District\_91' and 'Nechako\_Watershed\_E' as checked items, and 'ESRI' and 'OSM base' as unchecked items. The map scale is 1:7000000m. The text 'Terrace', 'Kitimat', and 'Prince George' are visible on the map. A '22 minutes remaining' timer is in the top right corner. The footer of the page reads 'Stewardship Portal | Version 3 | Build 5665M'.

- IWRG: Climate maps “in conversation”**
  - Maps of climate-focused research
  - Conversations about climate?
  - Links with other types of knowledge
- School District 91, IWRG, CIRC, ECHO...**
  - Youth-perspectives: Environment, Community, Health values
  - Community/school-based monitoring



# Identifying Youth Place-Based Values in School District 91



Stewardship Portal

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Integrated Watershed Research Group Portal

Fill a Form Search Reports Map Tools Links Dashboard 0 Logout

CIRC  
The Cumulative Impacts  
Research Consortium

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Workshop Follow-up Report:  
**'A Clean Environment Makes a Healthy Community'**  
Identifying youth place-based values in School District 91  
July 2017

**What is the CIRC?**

The Cumulative Impacts Research Consortium (CIRC) is a research and community outreach initiative located at the University of Northern British Columbia focused on better understanding the cumulative environmental, community and health impacts of resource development in northern B.C. For more information on our ongoing research and related initiatives, please visit [www.unbc.ca/cumulative-impacts](http://www.unbc.ca/cumulative-impacts).

**About the Workshop**

In order to better understand youth perspectives on regional environmental, community and health values, CIRC held a workshop with grade 8 students from School District 91 (SD91) on May 25, 2017. The overall goal of this workshop was to learn about the kinds of values that are important to youth living in SD91 in relation to resource development—a school district with 30 educational sites, 5,500 students,

Prince George

Steward

# Identifying Youth Place-Based Values in School District 91

Stewardship Portal

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

Integrated Watershed Research Group Portal

Fill a Form Search Reports Map Tools Links Dashboard 0 Logout

Submission Details: ID: 217 - CIRC\_Report - Gothreau

General	Submission Name
Preview	Title: ID: 217 - CIRC_Report - Gothreau
Allowed Users	Name: A Clean Environment Makes a Healthy Community
Spatial Data	
Attachments	
Child Submissions	
History	
Export	
	Dynamic Content
	What is the CIRC?:
	The Cumulative Impacts Research Consortium (CIRC) is a research and community outreach initiative located at the University of Northern British Columbia focused on better understanding the cumulative environmental, community and health impacts of resource development in northern B.C.
	About the Workshop:
	In order to better understand youth perspectives on regional environmental, community and health values, CIRC held a workshop with grade 8 students from School District 91 (SD91) on May 25, 2017. The overall goal of this workshop was to learn about the kinds of values that are important to youth living in SD91 in relation to resource development—a school district with 30

Prince George

# Identifying Youth Place-Based Values in School District 91

The screenshot shows a web browser window with the URL 'Stewardship Portal'. The page header features the UNBC logo (University of Northern British Columbia) and the title 'Integrated Watershed Research Group Portal'. Navigation buttons include 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard 0', and 'Logout'. A map of a watershed is visible in the background.

**Submission Details: ID: 217 - CIRC\_Report - Gothreau**

General	Author(s): CIRC
Preview	Title of Report: 'A Clean Environment Makes a Healthy Community' Identifying youth place-based values in School
Allowed Users	Publication Year: 2017
Spatial Data	Publication Type: Workshop Follow-up Report
Attachments	Report URL: <a href="http://www.unbc.ca/events/43900/identifying-youth-place-based-values-school-district-91">http://www.unbc.ca/events/43900/identifying-youth-place-based-values-school-district-91</a>
Child Submissions	Keywords: CIRC, School District 91, SD91, Community, Health, Environment
History	Associated Files: PDF: Full Report Photos: Two photographs of each completed map for three different classes School District 91 boundary shapefile
Export	

The map on the right shows a watershed boundary in green, with a blue outline indicating a specific area. The location 'Prince George' is labeled on the map.


# Identifying Youth Place-Based Values in School District 91

Stewardship Portal x Identifying Youth Place-Based Values in School District 91 x

www.unbc.ca/events/43900/identifying-youth-place-based-values-school-district-91

- Events Home
- Academic Dates +
- Dates & Deadlines
- Information Sessions
- Thesis Defences

## Identifying Youth Place-Based Values in School District 91



**Date:** Thursday, May 25, 2017 (All day)  
**Campus:** Off Campus

# Identifying Youth Place-Based Values in School District 91

The screenshot shows a web browser window with the URL 'Stewardship Portal'. The page header features the UNBC logo (University of Northern British Columbia) and the title 'Integrated Watershed Research Group Portal'. A navigation bar includes buttons for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard 0', and 'Logout'. The main content area displays a map of a watershed area, with a green-shaded region and a blue boundary. A 'Submission Details' window is open, showing the following information:

Submission Details: ID: 217 - CIRCS\_Report - Gothreau

Attachments		
<input type="checkbox"/>	File Name	Metadata
<input type="checkbox"/>	unbcircsd91finalworkshopreport.pdf	
<input type="checkbox"/>	class 1 combined 1.jpg	
<input type="checkbox"/>	class 1 combined 2.jpg	
<input type="checkbox"/>	class 2 combined 1.jpg	
<input type="checkbox"/>	class 2 combined 2.jpg	

The 'Spatial Layers' section includes a 'Valid Schemas' dropdown menu with 'SD\_91' selected. A 'From Map' button is visible at the bottom of the window.

# Identifying School Based Values in School District 91

The screenshot shows a web browser window with the URL "Stewardship Portal". The page header features the UNBC logo (University of Northern British Columbia) and the title "Integrated Watershed Research Group Portal". A navigation bar includes buttons for "Fill a Form", "Search", "Reports", "Map Tools", "Links", "Dashboard 0", and "Logout". The main content area displays a map of School District 91, with a green-shaded watershed area. Labels on the map include "Terrace", "Kitimat", and "Prince George". An inset image on the left shows a student-drawn map of the same area, with handwritten text: "I think God just really makes a town" and "A community is awesome! It's a small town and everyone is friendly". The word "COMMUNITY" is written vertically on both sides of the student map. The word "Steward" is partially visible in the bottom right corner of the map area.

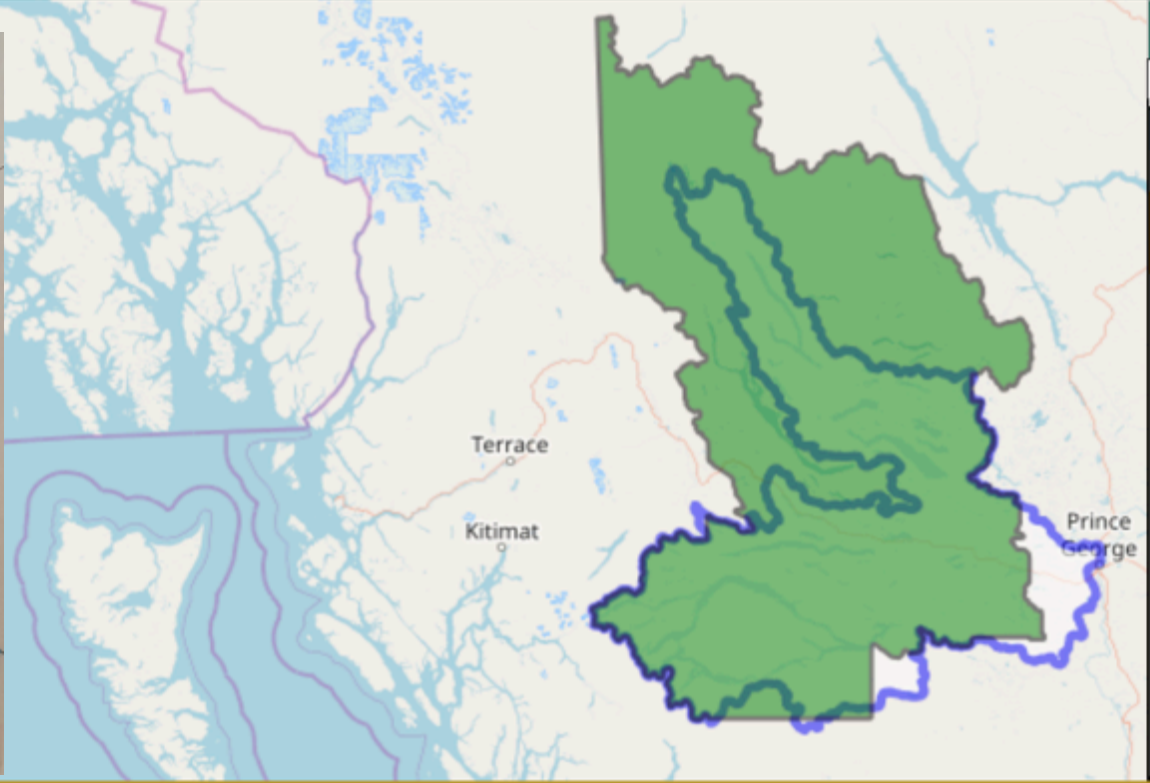

# Identifying Youth Place-Based Values in School District 91

Stewardship Portal

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

## Integrated Watershed Research Group Portal

Fill a Form Search Reports Map Tools Links Dashboard 0 Logout



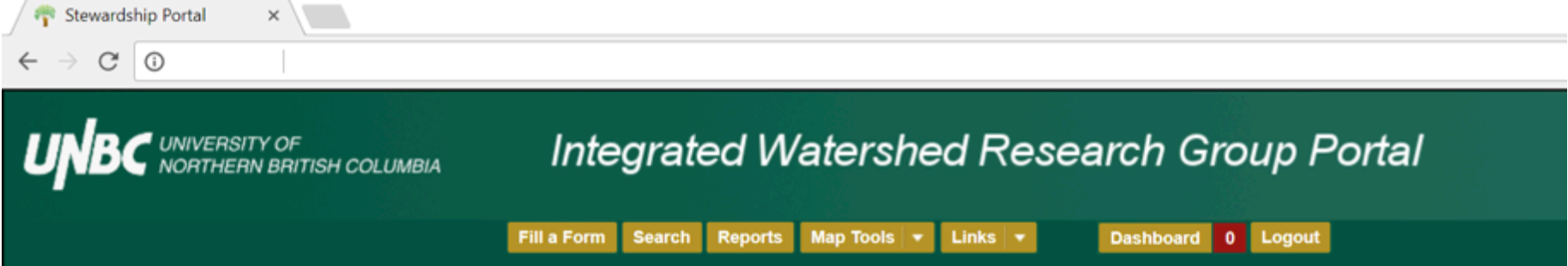
The image displays two maps side-by-side. On the left is a hand-drawn map titled 'ENVIRONMENT' in green. It shows a watershed area with various features like roads, rivers, and buildings. A red arrow points to a specific location. The map is surrounded by handwritten notes and drawings. On the right is a digital map of the same watershed area, with a green shaded region. Labels for 'Terrace', 'Kitimat', and 'Prince George' are visible. The map is part of a web portal interface.

# Identifying Youth Place-Based Values in School District 91

The screenshot displays the 'Stewardship Portal' for the University of Northern British Columbia (UNBC). The page header includes the UNBC logo and the text 'UNIVERSITY OF NORTHERN BRITISH COLUMBIA'. The main title is 'Integrated Watershed Research Group Portal'. A navigation bar contains buttons for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard 0', and 'Logout'. Below the navigation bar, two maps are shown side-by-side. The left map is a hand-drawn map titled 'HEALTH' in red. It features a central river and several handwritten quotes: 'The River brings the Community together', 'The important thing about my Community to me is that I live here.', 'I think our Community is trying to be a lot healthier', and 'A Clean Environment makes a healthy Community'. The right map is a digital map of the same watershed area, shaded in green, with labels for 'Terrace', 'Kitimat', and 'Prince George'. The word 'Stewards' is partially visible at the bottom right of the map area.

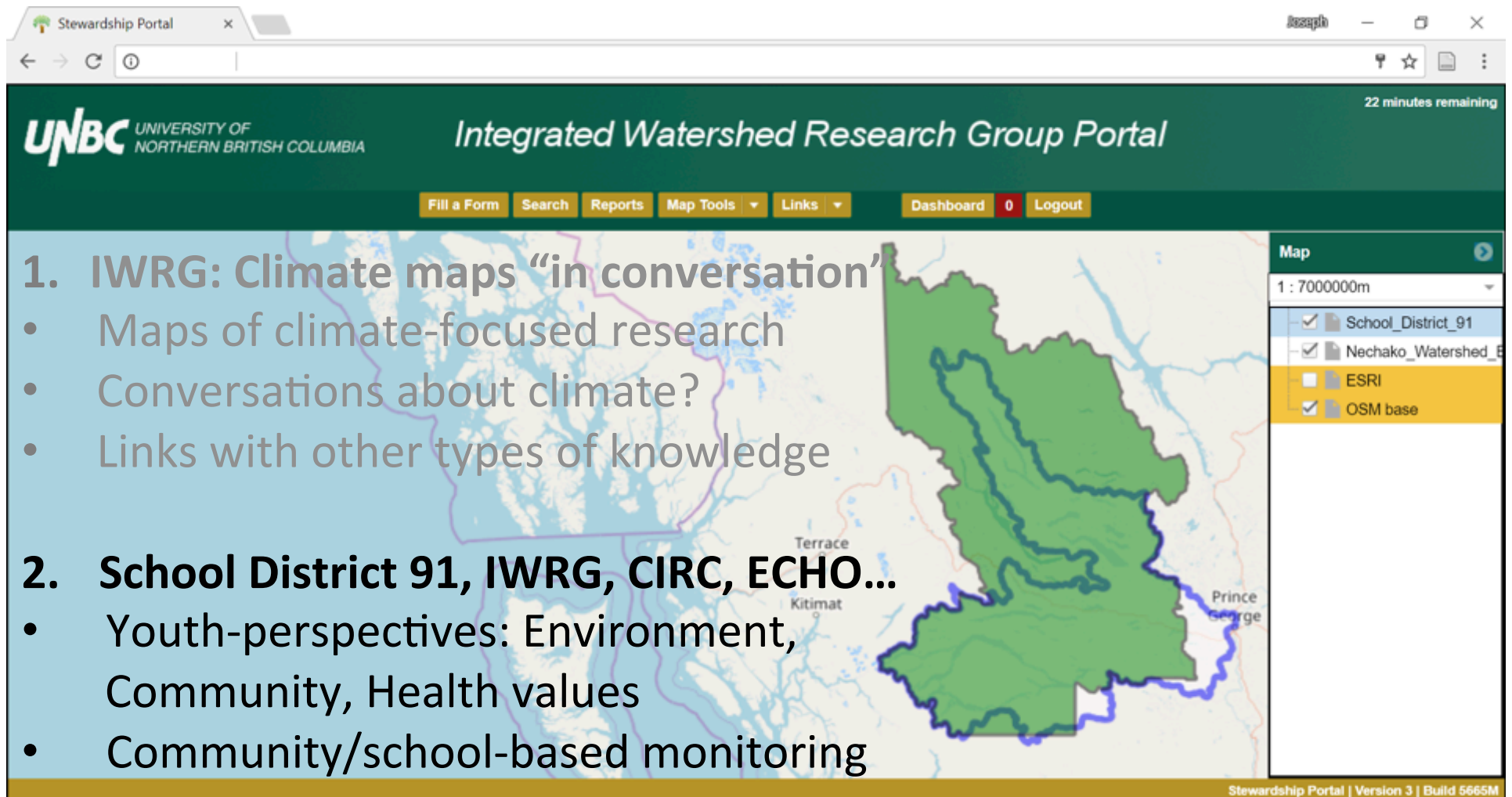


# Identifying Youth Place-Based Values in School District 91



Stewards

# A web-based portal refined in the Nechako



The screenshot shows a web browser window displaying the 'Stewardship Portal' for the University of Northern British Columbia. The page title is 'Integrated Watershed Research Group Portal'. The navigation bar includes links for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard' (with a red '0' indicator), and 'Logout'. A '22 minutes remaining' timer is visible in the top right corner. The main content area features a map of the Nechako Watershed, with a green shaded area representing the watershed boundary. A legend on the right side of the map shows the following layers: 'School\_District\_91' (checked), 'Nechako\_Watershed\_E' (checked), 'ESRI' (unchecked), and 'OSM base' (checked). The map also shows labels for 'Terrace', 'Kitimat', and 'Prince George'. The footer of the page reads 'Stewardship Portal | Version 3 | Build 5665M'.

- 1. IWRG: Climate maps “in conversation”**
  - Maps of climate-focused research
  - Conversations about climate?
  - Links with other types of knowledge
- 2. School District 91, IWRG, CIRC, ECHO...**
  - Youth-perspectives: Environment, Community, Health values
  - Community/school-based monitoring

# Community/School-based Monitoring with SD91

The screenshot displays the 'Stewardship Portal' web application. The browser window title is 'Stewardship Portal' and the user is logged in as 'Joseph'. The page features a dark green header with the UNBC logo and the text 'UNIVERSITY OF NORTHERN BRITISH COLUMBIA' and 'Integrated Watershed Research Group Portal'. A navigation bar includes buttons for 'Fill a Form', 'Search', 'Reports', 'Map Tools', 'Links', 'Dashboard 0', and 'Logout'. A timer in the top right corner shows '12 minutes remaining'. On the left, an 'Admin Panel' contains links for 'User Manager', 'Group Manager', 'Form Manager', 'Schema Manager', 'Sharable Manager', and 'System Manager'. The main area is a map showing a watershed with a red dot indicating a specific location. A legend on the right side of the map shows 'Barry\_Stream' (checked), 'ESRI' (unchecked), and 'OSM base' (checked). The bottom right corner of the map area displays 'Stewardship Portal | Version 3 | Build 5665M'.

# Community/School-based Monitoring with SD91

The screenshot shows a web browser window titled "Stewardship Portal". The page header includes the UNBC logo (University of Northern British Columbia) and the text "Integrated Watershed Research Group". Below the header is a navigation bar with buttons for "Fill a Form", "Search", "Reports", "Map Tools", "Links", and "Dashboard". On the left is an "Admin Panel" with links to "User Manager", "Group Manager", "Form Manager", "Schema Manager", "Sharable Manager", and "System Manager". The main content area is a map of a watershed with a red dot indicating a specific location. A legend on the right side of the map shows layers for "Barry\_Stream", "ESRI", and "OSM base".



# Community/School-based Monitoring with SD91

Stewardship Portal

Submission Details: ID: 633 - Generic\_2 - admin

General	<b>Dynamic Content</b>
Preview	Description of the content submitted
Allowed Users	
Spatial Data	
Attachments	Two photographs of Streamkeepers training occurring with School District 91 teachers and Barry Booth.
Child Submissions	
History	
Export	

Use this section to provide citation information

Title:

Authors(s):

Year:

List any relevant websites or physical locations of submitted content. This can also include linking to partners, funders, and other resources.

Helvetica  **B** *I* U T<sup>+</sup> T<sup>-</sup> **I** **T**

<http://www.pskf.ca/>

<http://www.sd91.bc.ca/>

<https://www.unbc.ca/integrated-watershed-research-group>

Keyword(s):

Additional Information:





# Community/School-based Monitoring with SD91

Stewardship Portal



Submission Details: ID: 633 - Generic\_2 - admin

- General
- Preview
- Allowed Users
- Spatial Data
- Attachments
- Child Submissions
- History
- Export

Attachments		
<input type="checkbox"/>	File Name	Metadata
<input type="checkbox"/>	 DSCF0104.jpg	
<input type="checkbox"/>	 DSCF0122.jpg	

Spatial Layers	
<input type="checkbox"/>	Layer Name
<input type="checkbox"/>	Barry_Stream



## A web-based portal refined in the Nechako

### Established Portal User Groups (Phase I)

- **IWRG**: from mapping and describing to bulk-loading existing knowledge...
- **CCN/Cheslatta Carrier Nation**:  
Archive & share
- **NEWSS: (Nechako Environment Water Stewardship Society)**  
Sharing and profiling stewardship initiatives
- **SD91**: School-kids engagement in monitoring (Pacific Streamkeepers)

- **Web-based** platform
- **Geospatial** means by which to store, search and access information
  - *“A geospatial library”?*
- **Open-source**, designed in northern BC, adapted to Nechako context /users
- **Expansion of options** for users and data-entry
- **User-group** oriented
  - *“like Google earth, but different”*

## A web-based portal refined in the Nechako

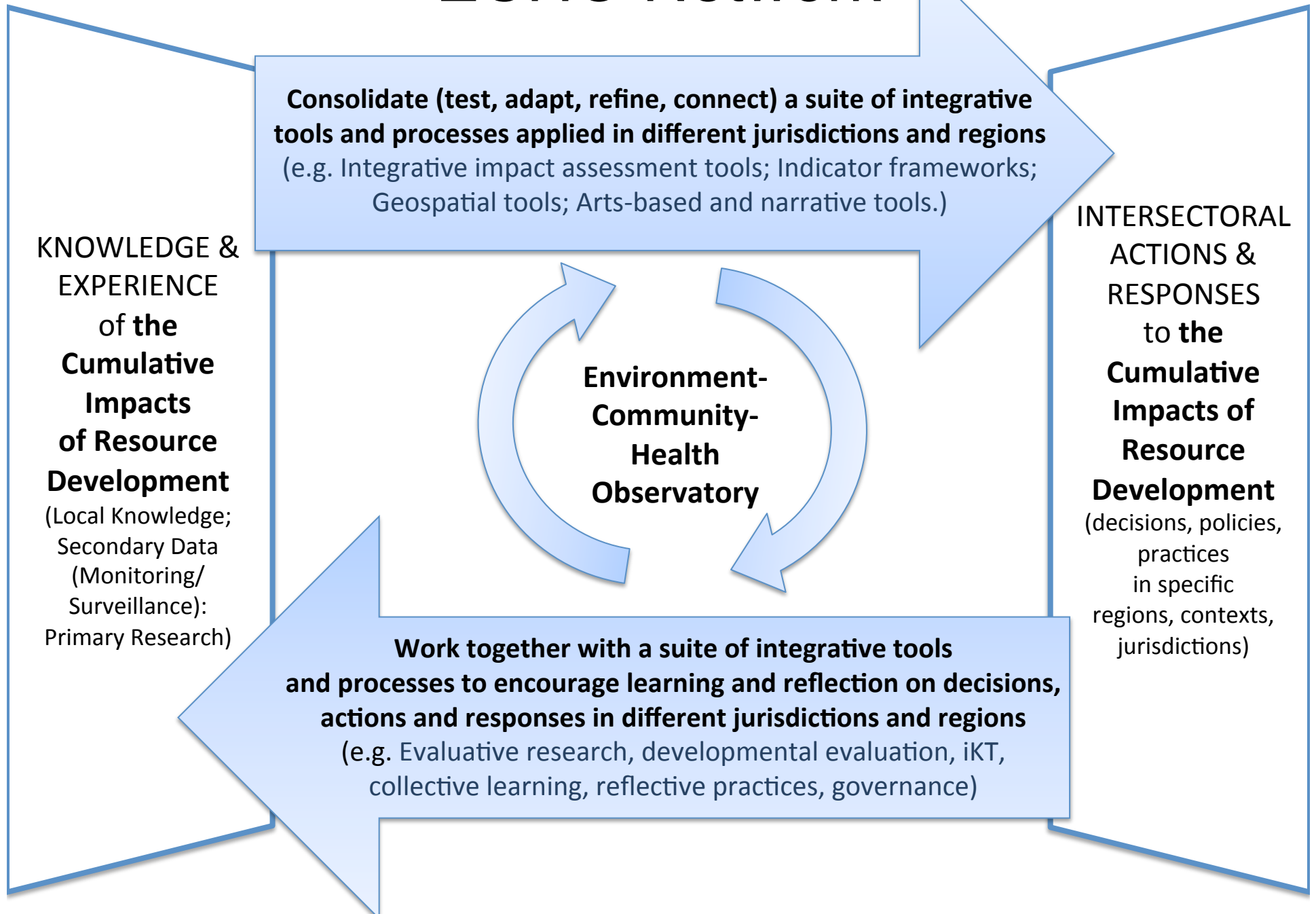
### Potential Portal User Groups (Phase II)

- **CIRC**: “Living Library” of resources... links with SD91
- **ECHO**: interest across the Environment, Community, Health Observatory Network
- **FLNROD**: remote monitoring data?
- **NWR (Nechako Watershed Roundtable)**: Bulk-loading and sharing of existing resources among groups

- **Web-based** platform
- **Geospatial** means by which to store, search and access information
  - “A *geospatial library*”?
- **Open-source**, designed in northern BC, adapted to Nechako context /users
- **Expansion of options** for users and data-entry
- **User-group** oriented  
“like Google earth, but different”



# ECHO Network



# ECHO Network

## Regional Contexts/Cases (Knowledge users and Collaborators)

First Nations Health Authority (BC)

Northern Health (Northern BC)

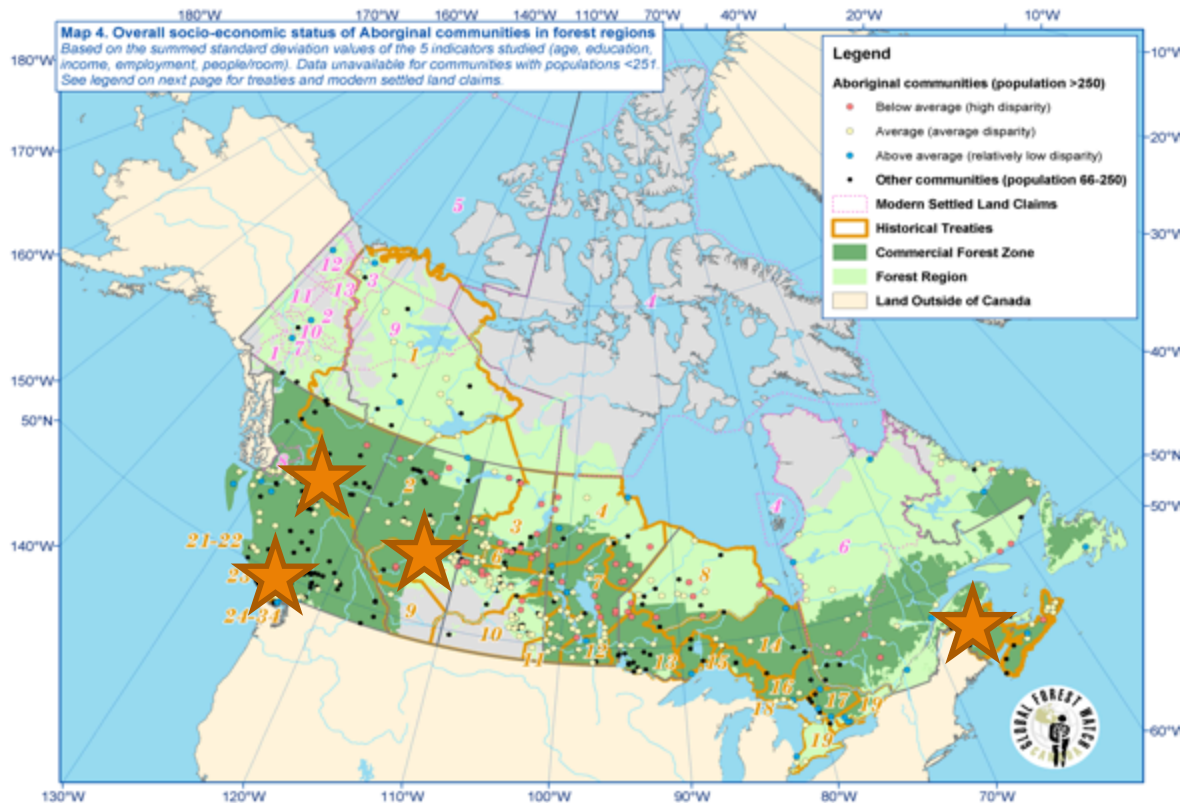
Battle River Watershed Alliance (AB)

NB Environmental Network (NB)

Future Regional Cases (in Canada; other countries)

KNOWLEDGE & EXPERIENCE of the **Cumulative Impacts of Resource Development** (Local Knowledge; Secondary Data (Monitoring/Surveillance); Primary Research)

INTERSECTORAL ACTIONS & RESPONSES to the **Cumulative Impacts of Resource Development** (decisions, policies, practices in specific regions, contexts, jurisdictions)



# Integrative approaches to Environment, Community & Health

**Theme 1:** CC as an overlay/  
driver of change?

**Theme 2:** Sediment  
sources & processes?



Diverse drivers of change in regions or landscapes of concern (e.g. the NRB);

*A 'cascade of effects and impacts'*

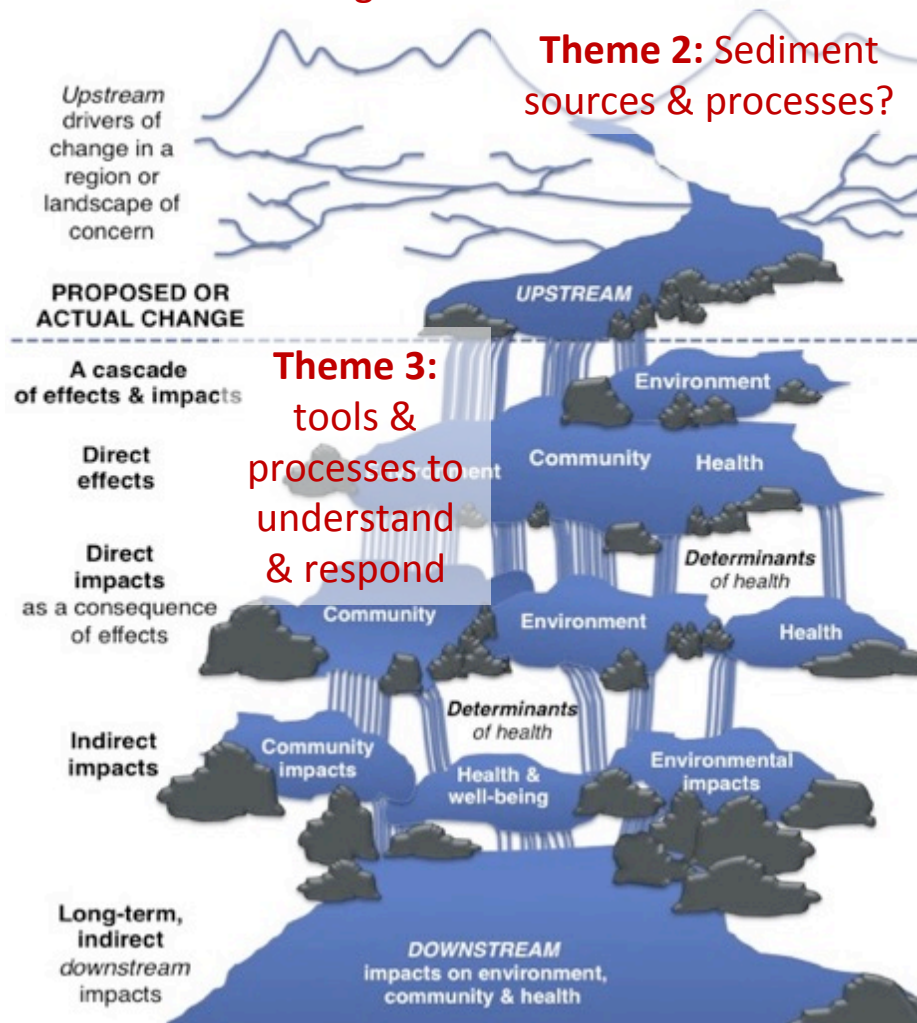
- Direct effects
- Direct impacts (as a consequence of effects)
- Indirect Impacts
- Long-term indirect (downstream) impacts

Parkes (2016) Chapter 5 in  
Gillingham et al. (2016). *The Integration Imperative: Cumulative Environmental, Community and Health Impacts of Multiple Natural Resource Developments*. Springer International Publishing AG.)

# Integrative approaches to Environment, Community & Health

**Theme 1:** CC as an overlay/  
driver of change?

**Theme 2:** Sediment  
sources & processes?



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- Canada Summer Jobs
- Canadian Institutes for Health Research
- Science Horizons
- UNBC

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- Nechako White Sturgeon Recovery Initiative
- Northern Health
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- Tatuk Lake Resort staff
- And a range of local community members

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