

Water Use for Oil and Gas Activity



2013 Annual Report



PURPOSE

The purpose of the 2013 Annual Report on Water Use for Oil and Gas Activity is to present data and information on water approvals, water withdrawal and water use related to the oil and gas industry, including hydraulic fracturing.

This report contains short-term water use data from the 2013 calendar year, including the cumulative volume of water approved for use and the volume reported as actually used by permit holders. It includes similar data on water licences in northeast British Columbia, which are valid for periods greater than two years. Information on water source wells, a well drilled to obtain water for the purpose of injection into underground formations to enhance oil and natural gas recovery, is included in the report. Finally, details on the volume of water used specifically for hydraulic fracturing are summarized.



Previous annual water reports and quarterly updates are available on the Commission's website at: <http://www.bcogc.ca/public-zone/water-information>

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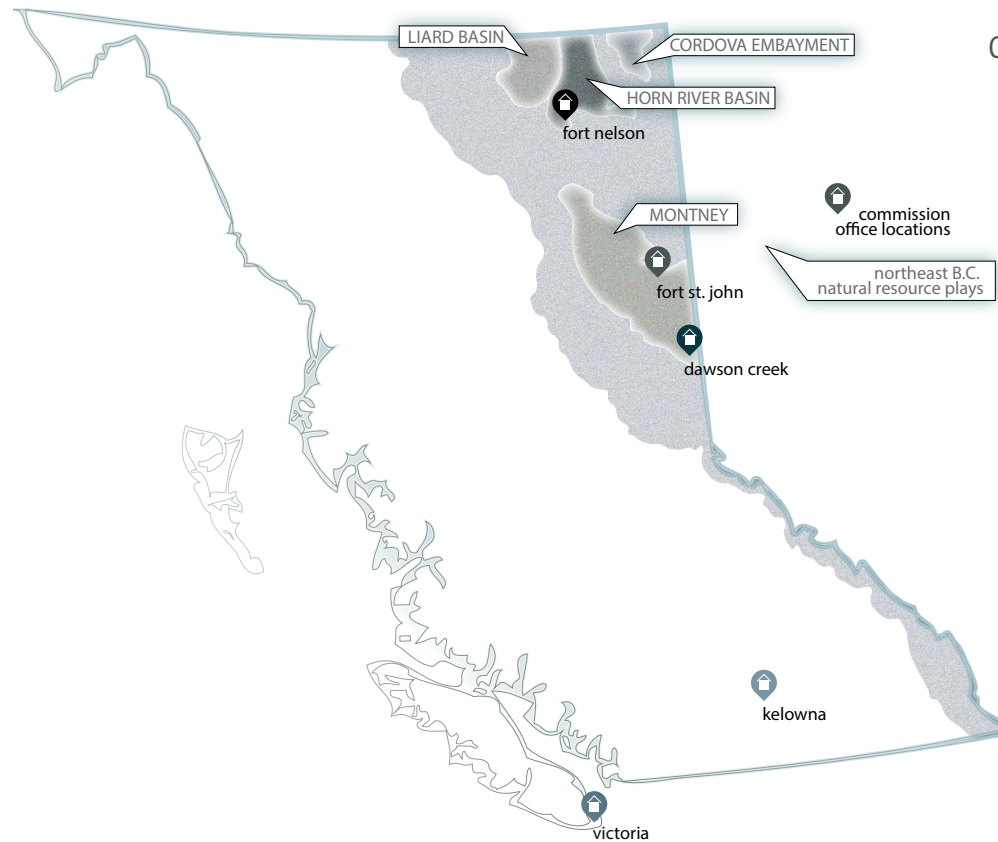
BC OIL AND GAS COMMISSION

The [BC Oil and Gas Commission](#) (Commission) is a single-window Crown corporation that regulates oil and gas activity in the Province of British Columbia.

The Commission regulates industry by way of the administration of the [Oil and Gas Activities Act \(OGAA\)](#), the [Petroleum and Natural Gas \(PNG\) Act](#), and associated regulations. Specified enactments provide the Commission additional authorities to permit oil and gas activities related to forestry, heritage conservation, roads, land and water use, and other natural resources. This consolidated authority allows the Commission to monitor activity in a comprehensive and effective manner where oil and gas activities occur, including on Crown land, privately held land, and the Agricultural Land Reserve.

The Commission is responsible for reviewing, assessing, and making decisions on water authorizations from both surface and subsurface water sources. The Commission has the expertise and tools to make informed water allocation decisions; protecting and maintaining environmental and community water needs are its first priorities.

Where water authorization is granted, the Commission becomes responsible for regulating the permissions by which oil and gas companies operate.



Commission Office Locations
Throughout B.C.

The Commission manages water use with a specific focus on environmental values at every opportunity, monitoring the water withdrawal and enforcing compliance with applicable legislation where required.

The Commission's workforce operates out of Fort Nelson, Fort St. John, Dawson Creek, Kelowna and Victoria, with the largest number of employees concentrated in Fort St. John, the heart of oil and gas activity in the province. The offices in Fort Nelson and Dawson Creek ensure the Commission's presence in communities of the Horn River Basin and Montney gas plays respectively.

HOW WATER IS USED

Water is used for various purposes in the oil and gas industry.



The largest use of water for oil and gas activities is for hydraulic fracturing.

However, water is used for other purposes, such as:



Seismic or geophysical exploration



Drilling



Machine washing



Dust control



Water floods (to enhance oil recovery)



Ice road freezing



Hydrostatic testing of pipelines

HOW WATER IS ACCESSED

There are different ways the oil and gas industry in British Columbia may access water. Some methods are managed through provincial legislation, including:

- **Water licences** issued under the Water Act. The Commission has staff designated as Regional Water Managers with authority for issuing and administering long-term water licences.
- **Short-term surface water use or diversion approvals** issued under Section 8 of the Water Act. Short-term water use is administered by the Commission.
- **Water source wells** authorized by the Commission under OGAA. Water source wells are a specific type of well where the water withdrawn is intended for the purpose of injection into an underground formation to enhance oil or natural gas recovery.
- **Flowback water** that returns to the surface after being injected for hydraulic fracturing.
- **Produced water** that flows to the surface as a by-product of oil and gas production.

The oil and gas industry can also access water by means currently outside of regulatory oversight:



- **Private agreements** can be made with landowners or others who have a source of surface water supply such as a dugout or a groundwater well.
- **Groundwater wells** for oil and gas use where the activity does not involve water injection (hydraulic fracturing) into the subsurface. These purposes include road maintenance, geophysical exploration, and other possible uses.

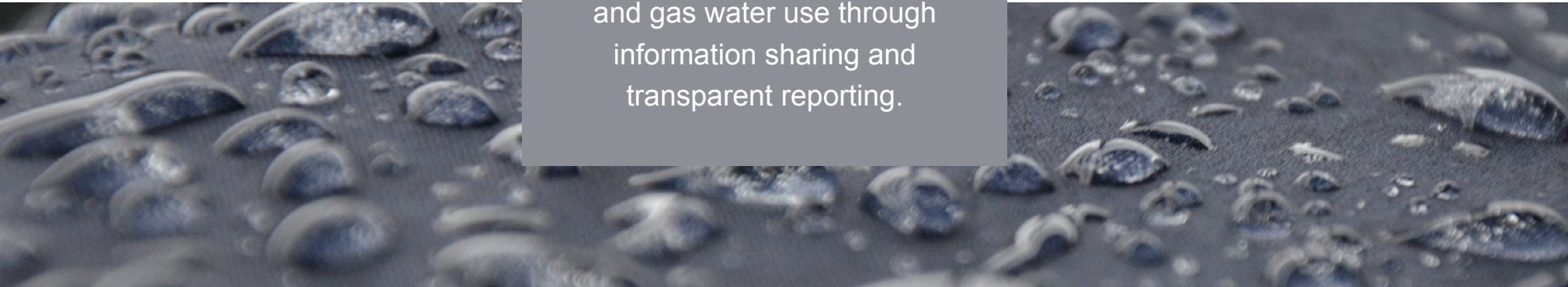
COMMISSION AUTHORITY FOR WATER

The [Water Act](#) is the primary provincial statute regulating water resources in B.C. Currently, only surface water in a “stream” is vested to the Crown for allocation through the Water Act. A “stream” includes a natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch.

Surface water use under the Water Act is regulated by the Commission through two processes:

- Section 8 of the Water Act allows for the issuance of permits for short-term water use, for a maximum 24 month period.
- Part 2 of the Water Act allows for the issuance of water licences, generally for terms of 5+ years.

Through OGAA, the Commission has authority to issue water use permits under Section 8 of the Water Act to manage short-term water use by the oil and gas industry.



Approvals under Section 8 authorize the diversion and use of water for a term not exceeding two years. Short-term water use approvals are typically used by industry during the exploration phase of development of natural gas or oil leases. Upon expiry, subsequent short-term water use approvals can be issued to applicants should further use of a short-term nature be required.

In March 2013, specific Commission staff were designated as Regional Water Managers under the Water Act, giving the Commission authority to issue and

Regional Water Managers and hydrologists serve to protect and conserve water resources and further public knowledge surrounding oil and gas water use through information sharing and transparent reporting.

administer water licences, generally for terms of five years or more, to the oil and gas sector.

As well as regulating surface water used for oil and gas activities, the Commission regulates aspects of subsurface water resources. OGAA provides the Commission authority for groundwater management of water source wells. A water source well is used to acquire water for injection to enhance oil or gas recovery. Water-related definitions are available on page 22.

The Commission has natural resource specialists trained to review and adjudicate applications for water use associated with oil and gas activities. The water used by industry is carefully monitored by knowledgeable geologists, hydrologists, hydrogeologists and engineers with the Commission. These specialists have expertise in northeast B.C.’s water resources and apply scientific and technical rigour to manage and protect the province’s water resources.



WATER USE REPORTING

For surface water sources managed under short-term water use approvals, operators must report monthly water withdrawals from each approved withdrawal location on a quarterly basis to the Commission. Companies failing to report water usage are referred to the Commission’s Compliance and Enforcement team. The role of this team is to investigate non-compliance, ensure operators comply with laws and permit conditions, and conduct follow-up inspections.



For water production from water source wells, operators are also required to report water withdrawal data on a monthly basis.

Since January 2014 the Commission has required mandatory reporting of water licences for oil and gas use. This change is a result of the Commission taking over administration of oil and gas water use licences. In the past, most water use authorized by way of a water licence did not have a requirement for mandatory reporting.

TOOLS FOR WATER MANAGEMENT

The Commission manages water approvals and use with specific focus on environmental values.



Methods and tools include:

- Seismic or geophysical exploration.
- The development of [OGC Watershed Management Basins](#) for northeast B.C. (derived from the Ministry of Environment’s Freshwater Atlas base map).
- The review of water use applications on a watershed basis with an understanding of cumulative effects to ensure withdrawals do not exceed environmental limits and environmental flows are maintained.
- The production of [publicly available reports](#) on water approvals and use.
- The management of special or unique situations, and the ability to take action if necessary, such as [suspending oil and gas water use](#) during the 2010 and 2012 summer droughts in northeast B.C.
- [The NorthEast Water Tool](#), a GIS-based hydrology decision-support tool.
- The development of a [Water Information Portal](#) to display available surface water and groundwater quantity and quality data throughout northeast B.C.
- Cooperation with water stewardship staff from [FLNRO](#) to ensure decisions are fully informed and coordinated.
- The transparent publication of all chemicals included in fracturing fluids and the total amount of water injected for hydraulic fracturing on [FracFocus.ca](#).

EXECUTIVE SUMMARY - 2013 SNAPSHOT

In 2013, there were 50 companies with 381 active Section 8 approvals from 1,489 points-of-diversion (Table 1). The total annual volume of water approved for withdrawal was 19,423,842 m³, which represents 0.016 per cent of the total mean annual runoff in northeast B.C. The total volume of extracted water reported was 2,896,865 m³, which corresponded to 0.002 per cent of the total mean annual runoff in northeast B.C. (Figure 1).

A total of 24 water licences associated with oil and gas activities, comprising 38 points-of-diversion, were active in 2013. The total licenced approval of water use for 2013 was 16,226,511 m³, which accounts for 0.013 per cent of the mean annual runoff. Data for actual water use was not available for most water licences for 2013, however, the water licences were amended to require mandatory reporting of water use, beginning January 2014.

Eight companies reported withdrawing 683,528 m³ of water from 31 water source wells in 2013.

A total of 5,341,635 m³ of water was used by 31 companies for hydraulic fracturing of 433 wells in 2013. The majority of wells hydraulically fractured were in the Montney Play (North and Heritage).

The NorthEast Water Tool (NEWT), a GIS-based hydrology decision support tool that provides guidance on water

availability across northeast B.C., was released for use in 2012. NEWT was acknowledged with a Premier’s Award for innovation in 2013.

The Commission, in partnership with FLNRO, [Geoscience BC](#) and the [Science and Community Environmental](#)

[Knowledge \(SCEK\) Fund](#), has recently developed a map-based [Water Information Portal](#), to provide public access to a wide range of water-related data and information in northeast B.C.

TABLE 1:
WATER APPROVAL AND USE FOR OIL AND GAS ACTIVITIES IN 2013

| | | |
|----------------------|--|------------|
| SHORT-TERM | Companies with Active Section 8 Approvals | 50 |
| | Active Section 8s | 381 |
| | Approved Withdrawal locations for Section 8s | 1,489 |
| | Volume Available for Use for Section 8s (m³) | 19,423,842 |
| | Volume Reported Withdrawn for Section 8s (m³) | 2,896,865 |
| WATER LICENCE | Companies with Active Water Licences | 10 |
| | Active Water Licences | 24 |
| | Licenced Withdrawal Locations | 38 |
| | Volume Available for Use for Water Licence (m³) | 16,226,511 |
| WATER SOURCE WELLS | Companies Reporting Water Source Wells | 8 |
| | Water Source Wells | 31 |
| | Volume of Water Extracted from Water Source Wells (m³) | 683,528 |
| HYDRAULIC FRACTURING | Companies that Hydraulically Fractured Wells | 31 |
| | Hydraulically Fractured Wells | 433 |
| | Volume of Water Injected for Hydraulic Fracturing (m³) | 5,341,635 |

FIGURE 1: COMPARISON OF ANNUAL RUNOFF, WATER APPROVALS AND VOLUMES REPORTED WITHDRAWN IN 2013

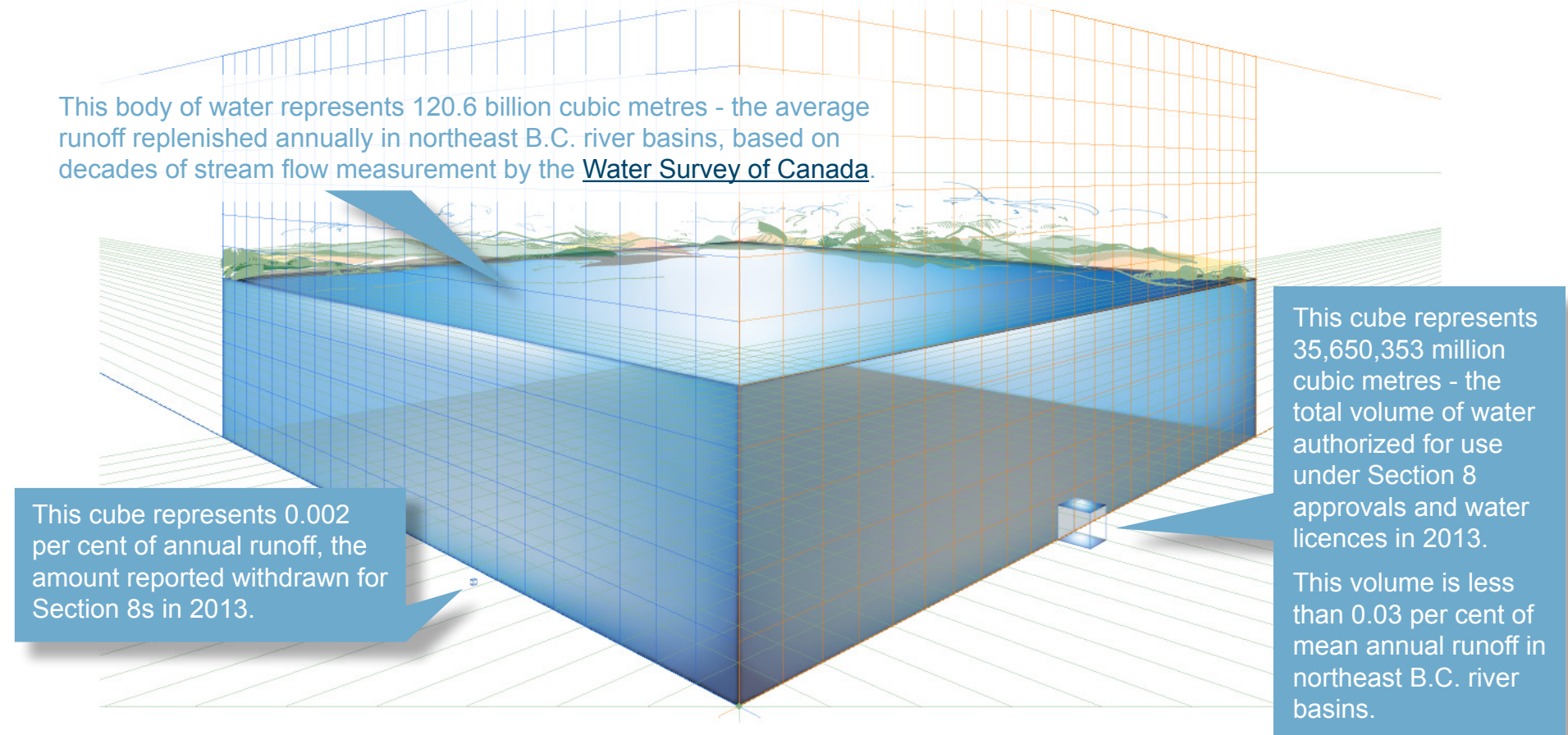


Figure 1 provides a comparison of the average volume of annual runoff in northeast B.C. river basins against Section 8 and licenced water volumes approved for use, and actual volumes reported withdrawn.

Table 2 provides comparative data on total volumes withdrawn each quarter by way of Section 8 approvals for the years 2011 through 2013.

TABLE 2 - QUARTERLY WATER WITHDRAWALS FROM SECTION 8 APPROVALS, 2011 - 2013

| | Q1 | Q2 | Q3 | Q4 | SUM |
|------|-----------|---------|-----------|-----------|-----------|
| 2011 | 782,388 | 662,767 | 1,266,317 | 1,100,613 | 3,812,085 |
| 2012 | 1,345,289 | 982,376 | 1,088,192 | 340,607 | 3,756,464 |
| 2013 | 1,061,417 | 482,054 | 605,408 | 747,986 | 2,896,865 |

SECTION 8 WATER APPROVALS

SHORT-TERM WATER USE

O GAA provides authority to the Commission to issue short-term water use permits under Section 8 of the Water Act:

WATER ACT

Short-term use of water (Section 8)

8 (1) If diversion or use of water is required for a term not exceeding 24 months, the comptroller or a regional water manager may, without issuing a licence, grant an approval in writing, approving the diversion or use, or both, of the water on the conditions the comptroller or regional water manager considers advisable.

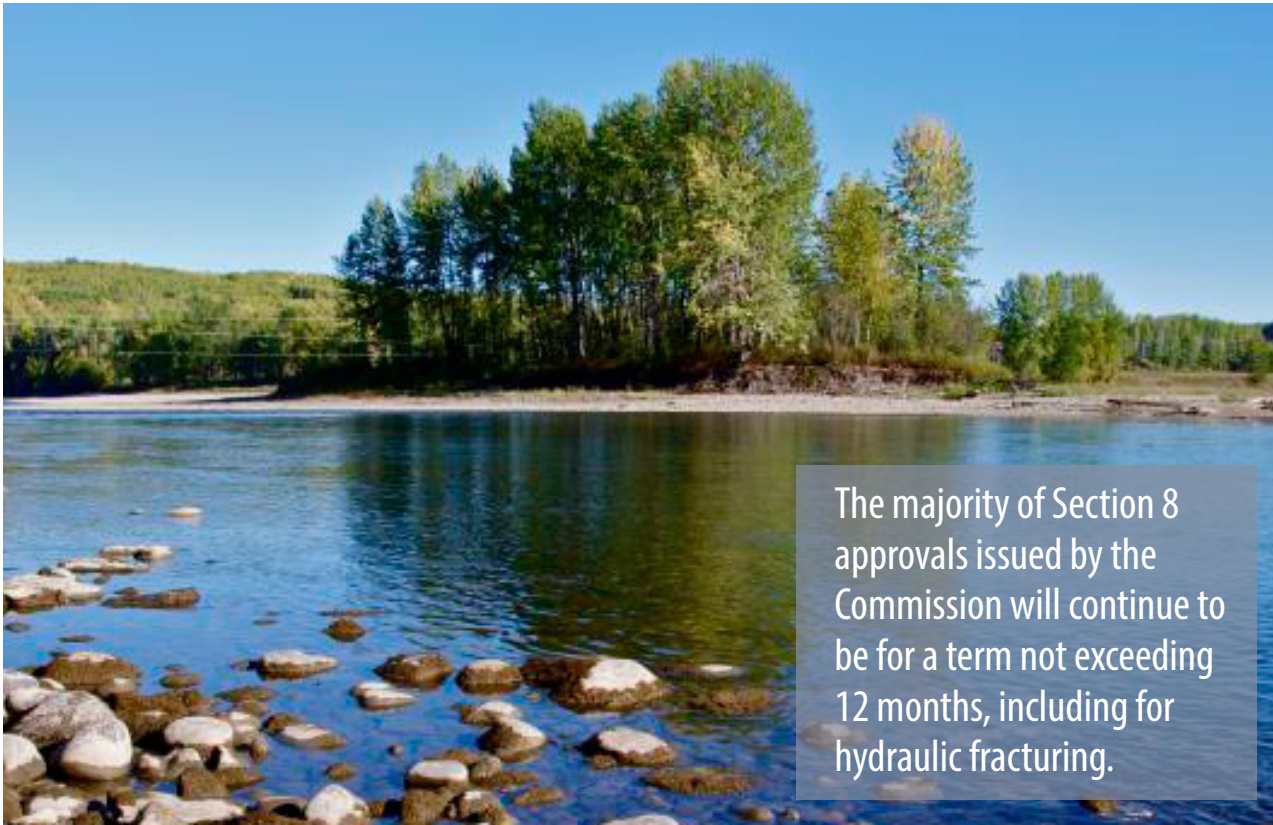
(2) Even though a licence has not been issued, a person is not prohibited from diverting or using water in accordance with an approval given under this section or in accordance with the regulations.

(3) The provisions respecting a licence, except Section 7, apply to a diversion or use of water under an approval under subsection (1) of this section or under the regulations.

In March 2011, the Commission issued [Directive 2011-02](#) requiring oil and gas companies holding Section 8 water use approvals to submit monthly water withdrawal data to the Commission on a quarterly basis. Water withdrawal data is reported for each approved withdrawal location (lake, stream, water source dugout, etc.), commonly known as a point-of-diversion. In the case of a “Basin

Section 8”, the cumulative total for each approved basin is submitted. Basin Section 8s are further described in the glossary on page 22.

In April 2013 the Province of British Columbia brought into force a 2010 amendment to the Water Act to allow short-term water use approvals (Section 8) to be issued



for a period not exceeding 24 months (a change from the previous maximum term of 12 months).

The majority of Section 8 approvals issued by the Commission will continue to be for a term not exceeding 12 months, including for hydraulic fracturing. However, some may be issued for a term of up to 24 months - these generally include approvals for geophysical activity, winter road construction, or water source dugouts.

In addition, Section 8 applications for greater than 200 m³/day, or greater than 10,000 m³/year, or for a purpose of Oil Field Injection (which includes hydraulic fracturing), require a Water Supply/Demand Analysis to

be submitted to better manage the water supply in northeast B.C. The Water Supply/Demand Analysis is a report that provides detail on the water demand, a rationale to support the volume of water requested, and detail on the hydrology of the applicable water body or water bodies. The rationale and data is used by the Commission’s decision-maker, as well as providing valuable context for other parties, such as First Nations.

In 2013, there were 50 companies with 381 active Section 8 approvals from 1,489 points-of-diversion (Table 1 on page 8). The total annual volume of water approved for withdrawal was 19,423,842 m³. The total volume of extracted water reported was 2,896,865 m³

(14.9 per cent of the approved volume). Section 8 water withdrawals for 2013 were slightly less than withdrawals in 2011 (3,812,085 m³) and 2012 (3,756,464 m³) as shown in Table 2 on page 9.

In most river basins in northeast B.C., the total approved short-term water use was a small fraction of the mean annual runoff (Appendix 2, page 24). The basins with the largest total approved volumes as a percentage of mean annual runoff for 2013 are listed in Table 3, below.

For all the remaining basins, the approved short-term water use corresponded to less than 0.20 per cent of mean annual runoff.

TABLE 3:
SHORT-TERM
WATER USE
APPROVALS AND
WITHDRAWALS
AS A PERCENTAGE
OF MEAN ANNUAL
RUNOFF IN 2013

| BASINS WITH THE LARGEST TOTAL APPROVED VOLUMES AS A PERCENTAGE OF MEAN ANNUAL RUNOFF | | BASINS WITH THE LARGEST WATER WITHDRAWAL AS A PERCENTAGE OF MEAN ANNUAL RUNOFF | |
|--|------------|--|------------|
| OGC WATER MANAGEMENT BASIN | PERCENTAGE | OGC WATER MANAGEMENT BASIN | PERCENTAGE |
| East Kiskatinaw | 0.71 | Cameron River | 0.09 |
| Middle Kiskatinaw | 0.43 | Upper Sikanni Chief River | 0.09 |
| Kiskatinaw River Total | 0.40 | West Kiskatinaw | 0.05 |
| Cameron River | 0.35 | Middle Sikanni Chief River Total | 0.04 |
| Kiwigana River | 0.24 | Middle Kiskatinaw River | 0.04 |
| Capot-Blanc Creek | 0.24 | East Kiskatinaw River | 0.04 |
| Sahdoanah River | 0.24 | Upper Beaton River | 0.04 |
| West Kiskatinaw | 0.20 | | |

Actual water withdrawal in individual basins is a small fraction of the approved water use. The basins with the largest actual volume of water withdrawn as a percentage of mean annual runoff for 2013 are listed in Table 3 on page 11.

For all the remaining basins, the actual volume of water withdrawn corresponded to less than 0.04 per cent of mean annual runoff.

The mean annual runoff for the various rivers and streams across northeast B.C. is about 120.6 billion m³ (based on data collected by the [Water Survey of Canada](#)).

The cumulative total of all Section 8 water approvals in 2013 represents 0.016 per cent of the mean annual runoff. The cumulative total of actual water withdrawals in 2013 represents 0.002 per cent of the mean annual runoff (Figure 1, page 9).

In 2013, water source dugouts comprised the most points-of-diversion at 1,057 (71.0 per cent) as shown in Table 4. Rivers accounted for 216 (14.5 per cent) points-of-diversion. Water source dugouts had the highest annual approval at 10,437,505 m³ (53.8 per cent), while rivers had the second highest with an approval volume of 7,468,564 m³ (38.5 per cent). Conversely, the highest

volume of water withdrawn was from rivers at 1,978,444 m³ (68.3 per cent), compared to water source dugouts at 854,161 m³ (29.5 per cent).

A summary of Section 8 data for individual oil and gas companies is shown in Table 5 on page 13.

In 2013, Encana Corporation had the most active points-of-diversion at 290 (19.5 per cent). Canadian Natural Resources Limited (192 points-of-diversion; 12.9 per cent) and ConocoPhillips Canada Operations Ltd. / ConocoPhillips Canada Resources Corp (186 points-of-diversion, 12.5 per cent) had second and third highest number of water withdrawal locations.

Progress Energy Canada had the greatest total approval volume at 5,119,157 m³ (26.4 per cent). Encana Corporation (3,246,864 m³, 16.7 per cent) and ConocoPhillips Canada Operations Ltd. / ConocoPhillips Canada Resources Corp (1,709,894 m³, 8.8 per cent) had the second and third highest Section 8 approval volume.

Three companies, Progress Energy Canada Ltd. (1,210,801 m³, 41.8 per cent), Encana Corporation (828,667 m³, 28.6 per cent) and Canadian Natural Resources Limited (310,512 m³, 10.7 per cent) accounted for about four-fifths of all water extracted under Section 8 approvals.

TABLE 4: SECTION 8 WATER SOURCE TYPES IN 2013

| STREAM/RIVER LAKE WATER SOURCE DOUGOUT BASIN OTHER GRAND TOTAL | NUMBER OF APPROVED WITHDRAWAL LOCATIONS | | WATER APPROVAL VOLUME (m³) | | WATER WITHDRAWAL VOLUME (m³) | |
|---|---|-------|----------------------------|-------|------------------------------|-------|
| | | % | | % | | % |
| | 216 | 14.5 | 7,468,564 | 38.5 | 1,978,444 | 68.3 |
| | 97 | 6.5 | 563,635 | 2.9 | 41,000 | 1.4 |
| | 1,057 | 71.0 | 10,437,505 | 53.8 | 854,161 | 29.5 |
| | 74 | 5.0 | 352,677 | 1.8 | 16,235 | 0.6 |
| | 45 | 3.0 | 601,460 | 3.1 | 7,025 | 0.2 |
| | 1,489 | 100.0 | 19,423,842 | 100.0 | 2,896,865 | 100.0 |

TABLE 5 - 2013 SECTION 8 WATER APPROVALS AND USE DATA ORGANIZED BY COMPANY

| COMPANY | NUMBER OF APPROVED WITHDRAWAL LOCATIONS | TOTAL VOLUME APPROVED (m³) | TOTAL VOLUME WITHDRAWN (m³) | COMPANY | NUMBER OF APPROVED WITHDRAWAL LOCATIONS | TOTAL VOLUME APPROVED (m³) | TOTAL VOLUME WITHDRAWN (m³) |
|---------------------------------------|---|----------------------------|-----------------------------|---------------------------------------|---|----------------------------|-----------------------------|
| | | | | | | | |
| Apache Canada Ltd. | 93 | 1,306,009 | 109,714 | Northpoint Energy Ltd. | 1 | 967 | 0 |
| Arc Resources Ltd. | 10 | 110,804 | 125 | Nova Gas Transmission Ltd. | 17 | 89,473 | 0 |
| Arcis Seismic Solutions Corp. | 6 | 3,190 | 739 | Nuvista Energy Ltd. | 13 | 31,844 | 4,220 |
| Artek Exploration Ltd. | 2 | 1,512 | 0 | Olympic Seismic Ltd. | 4 | 20,000 | 0 |
| Baytex Energy Ltd. | 6 | 17,038 | 0 | Pacific Trail Pipelines Mgmt Inc. | 22 | 5,000 | 3 |
| Black Swan Energy Ltd. | 5 | 102,149 | 47,443 | Painted Pony Petroleum Ltd. | 3 | 234,850 | 3,126 |
| Bonavista Energy Corp. | 3 | 9,150 | 2,308 | Paramount Resources Ltd. | 59 | 485,617 | 32,184 |
| Canadian Natural Resources Ltd. | 192 | 1,454,766 | 310,512 | Pengrowth Energy Corp. | 14 | 69,900 | 0 |
| Canbriam Energy Inc. | 3 | 206,472 | 0 | Penn West Petroleum Ltd. | 77 | 433,404 | 19,978 |
| Carmel Bay Exploration Ltd. | 2 | 19,000 | 2,514 | Plateau Pipe Line Ltd. | 1 | 1,100 | 0 |
| Challenger Geophysical Ltd. | 1 | 5,000 | 0 | Polar Star Canadian Oil and Gas, Inc. | 6 | 32,200 | 0 |
| Coastal Gaslink Pipeline Ltd. | 27 | 8,807 | 232 | Prince Rupert Gas Transmission Ltd. | 5 | 600 | 0 |
| ConocoPhillips Canada Operations Ltd. | 182 | 1,703,219 | 28,441 | Progress Energy Canada Ltd. | 71 | 5,119,157 | 1,210,801 |
| ConocoPhillips Canada Resources Corp. | 4 | 6,675 | 1,587 | Quicksilver Resources Canada Ltd. | 5 | 460,079 | 0 |
| Delphi Energy Corp. | 1 | 250 | 0 | Saguaro Resources Ltd. | 3 | 300,000 | 0 |
| Devon Canada Corp. | 37 | 93,433 | 27,097 | Shell Canada Limited | 33 | 610,542 | 14,080 |
| Devon NEC Corp. | 17 | 59,037 | 14,163 | SMR Oil & Gas Ltd. | 3 | 7,655 | 0 |
| Divestco Inc. | 1 | 5,000 | 0 | Storm Resources Ltd. | 13 | 59,310 | 0 |
| Encana Corp. | 290 | 3,246,864 | 828,667 | STX Energy Canada Inc. | 17 | 70,600 | 0 |
| Endurance B.C. Gas Ltd. | 7 | 74,200 | 18,617 | Suncor Energy Inc. | 9 | 27,429 | 2,678 |
| Enerplus Corp. | 18 | 35,570 | 6,582 | Talisman Energy Inc. | 13 | 26,150 | 9,929 |
| Harvest Operations Corp. | 16 | 94,378 | 28,352 | Taq North Ltd. | 67 | 533,890 | 3,114 |
| Husky Oil Operations Ltd. | 25 | 164,232 | 35,369 | Tourmaline Oil Corp. | 3 | 315,000 | 0 |
| Imperial Oil Resources Ltd. | 7 | 672,727 | 4,285 | UGR Blair Creek Ltd. | 1 | 405 | 0 |
| Ish Energy Ltd. | 23 | 301,396 | 0 | Westcoast Energy Inc. | 10 | 210,620 | 384 |
| Nexen Energy Ulc | 32 | 549,875 | 128,911 | Yoho Resources Inc. | 9 | 27,300 | 710 |
| | | | | GRAND TOTAL | 1,489 | 19,423,842 | 2,896,865 |

WATER LICENCES

LONG-TERM WATER USE

In March 2013, FLNRO designated specific Commission staff as Regional Water Managers under the Water Act, giving them authority to issue and administer water licences for the oil and gas sector. In total, 24 active water licences, comprising 38 points-of-diversion were transferred to the Commission (Table 1 on page 8). The total licenced approval of water use for 2013 was 16,226,511 m³, which accounts for 0.014 per cent of the mean annual runoff (Appendix 2, page 24).

Mandatory reporting of water use under water licences has generally not been a requirement. As a result, this report does not include data on the actual water use associated with the licences. Since assuming responsibility for the water licences, the Commission amended the licences to require water use reporting and will begin reporting data on actual use in the first quarter of 2014.

The basin with the highest percentage of oil and gas related water licence approval compared to mean annual runoff was the Doig River at 2,321,800 m³ representing 0.72 per cent of mean annual flow. Canadian Natural Resources Limited has four water licences from 1 point-of-diversion on the Doig River. The licences have priority statuses from the 1960s.

In 2013, four water licences, representing 5 points-of-diversion, expired. Further details on active oil and gas related water licences can be found in Table 6.



Flow through surface water allocations do not have water removed from the system; the water is used in place, and remains within the specific river or lake that is the licence’s source.

Flow Through Water Licences:

| | m³ / yr |
|-----------------------|---------------|
| Hydropower Generation | 124.6 billion |
| Hydropower Storage | 39.5 billion |
| Cooling | 87.1 million |
| Fire Prevention | 41.5 million |
| Conservation | 16.6 million |

TABLE 6: OIL AND GAS RELATED WATER LICENCES ACTIVE IN 2013 AND TRANSFERRED TO THE RESPONSIBILITY OF THE COMMISSION

There are currently 377 water licences, representing 783 points-of-diversion currently held by other parties for a variety of water use purposes, including domestic and municipal water supply, pulp mills, industrial, forestry, agriculture, and a number of others. These non-oil and gas water licences authorize the withdrawal of 184,677,818 m³/yr (excluding hydropower generation and storage).

A breakdown of licenced water use in northeast British Columbia as at October 2013 is shown below. Flow through surface water allocations do not have water removed from the system; the water is used in place and remains within the specific river or lake that is the licence’s source. Consumptive surface water allocations remove water from the system and the water is not returned.

Consumptive Use Water Licences:

| | m³ / yr |
|-----------------------|--------------|
| Oil and Gas | 16.2 million |
| Domestic & Waterworks | 15.4 million |
| Forestry | 11.2 million |
| Mining | 8.2 million |
| Agriculture & Range | 3.6 million |
| Road Maintenance | 0.6 million |

| LICENCE NUMBER | LICENCEE | PRIORITY DATE (yyyy.mm.dd) | LICENCE STATUS DATE (yyyy.mm.dd) | EXPIRY DATE (yyyy.mm.dd) | SOURCE | NUMBER OF POINTS OF DIVERSION | OGC WATER MANAGEMENT BASIN | DAILY APPROVAL (m³/day) | ANNUAL APPROVAL (m³/yr) | PURPOSE | PERIOD OF USE |
|----------------|----------------------------|-------------------------------|-------------------------------------|-----------------------------|--|-------------------------------|----------------------------|----------------------------|----------------------------|--|---|
| C030560 | CNRL | 1963.09.19 | 1966.01.03 | N/A | Doig River | 1 | Doig River | 3,181 | 1,160,900 | Oil Field Injection (OFI) | Whole Year |
| C032839 | CNRL | 1966.10.07 | 1967.12.15 | N/A | Doig River | 1 | Doig River | 3,181 | 1,160,900 | OFI | Whole Year |
| C033691 | CNRL | 1967.06.22 | 1968.10.01 | N/A | Doig River | 1 | Doig River | N/A | N/A | OFI | Whole Year |
| C033692 | CNRL | 1967.06.22 | 1968.10.01 | N/A | Doig River | 1 | Doig River | N/A | N/A | Storage-Non Power | Whole Year |
| C111413 | Shell Canada Energy | 1996.08.20 | 1998.03.25 | 2027.04.28 | Kiskatinaw River | 1 | Lower Kiskatinaw Rvr | 1,080 | 400,000 | “OFI; Storage-Non Power” | Whole Year |
| C112155 | Imperial Oil Resources Ltd | 1970.09.04 | 1998.03.18 | N/A | Peace River | 1 | Lower Peace River | 5,000 | 1,825,000 | OFI | Whole Year |
| C113187 | CNRL | 1970.01.08 | 1998.08.26 | N/A | Inga Lake & Coplin Creek | 2 | Cache Creek | 507 | 185,000 | “OFI; Storage-Non Power” | Whole Year |
| C113545 | Tervita Corp | 1998.07.16 | 1999.06.23 | N/A | Rudiger One Lake & Rudiger Two Lake | 2 | Blueberry River | 100 | 15,100 | Industrial (drilling oil and gas activity) | Nov 1 - Mar 31 |
| C117683 | TAQA North Ltd | 1964.09.16 | 2002.10.31 | N/A | Hogg Creek | 1 | Lower Peace River | | 892,469 | “OFI; Storage-Non Power” | Whole Year |
| C122399 | Encana Corp | 2006.11.27 | 2007.03.13 | N/A | Tupper River | 1 | Pouce Coupe River | 230 | 2,000 | Industrial (processing) | Apr 1 - Dec 31 |
| C122423 | Encana Corp | 2006.12.13 | 2007.03.13 | N/A | Steepprock Creek | 1 | Smoky River | 115 | 2,500 | Industrial (processing) | Whole Year |
| C122523 | Encana Corp | 2007.01.25 | 2008.11.27 | 2013.11.27 | Twin Lakes (Upper) & BP-48 Creek | 2 | Smoky River | 1,000 | 25,000 | Industrial (mining equipment) | Whole Year |
| C122524 | Encana Corp | 2007.01.25 | 2008.11.03 | 2013.11.03 | Wasp Lake | 1 | Murray River | 1,000 | 8,500 | Industrial (mining equipment) | Nov 1 - Apr 30 |
| C123577 | Encana Corp | 2007.03.16 | 2008.06.27 | 2013.06.27 | Two Island Lake | 1 | Kiwigana River | 2,600 | 100,000 | Industrial (Mining) | Whole Year |
| C123616 | Devon Canada Corp | 2008.02.12 | 2008.07.04 | 2013.07.04 | Tsea River | 1 | Tsea River | various | 50,976 | OFI | Apr 16 - Nov 30: 0.0058m³/s & Dec 1 - Apr 15: 0.0012 m³/s |
| C125903 | Encana Corp | 2007.04.02 | 2011.02.18 | 2016.12.31 | Lower Trail Lake, Tightfit Lake, and Trail Lake | 3 | Tsea River | 500 | 40,000 | “OFI; Mining Equipment; Road Maintenance” | Whole Year |
| C125925 | Encana Corp | 2007.04.02 | 2011.02.18 | 2016.12.31 | Yesshadle Creek | 2 | Middle Petitot Rvr | 250 | 26,666 | “OFI; Mining Equipment; Road Maintenance” | Whole Year |
| C125934 | Encana Corp | 2007.03.16 | 2011.02.18 | 2016.12.31 | 5 ZZ Lakes | 5 | Kiwigana | 500 | 42,500 | “OFI; Cooling; Road Maintenance” | Nov 1 - Mar 31 |
| C126000 | Encana Corp | 2007.01.25 | 2011.03.14 | 2016.12.31 | Coldstream Creek, Salt Creek, Skunk Creek, Tepee Creek, & 3 ZZ Creek (80570) | 7 | Murray River | 240 | 25,000 | “OFI; Cooling; Road Maintenance” | Whole Year |
| C126023 | Encana Corp | 2007.04.02 | 2011.02.18 | 2016.12.31 | Komie Lake, South Texaco Lake | 2 | Sahtaneh River | 500 | 40,000 | “OFI; Mining Equipment; Road Maintenance” | Apr 1 - Oct 31 |
| C126568 | Talisman Energy Inc | 2010.10.26 | 2011.07.25 | 2031.12.31 | South Texaco Lake | 1 | Lower Petitot Rvr | 500 | 30,000 | As above | Apr 1 - Oct 31 |
| C126877 | Devon Canada Corp | 1979.06.08 | 2011.12.09 | 2021.12.31 | Williston Lake | 1 | Peace Arm | 10,000 | 3,650,000 | OFI | Whole Year |
| C127223 | Canbriam Energy Inc | 2011.02.15 | 2012.01.12 | 2031.12.31 | Charlie Lake | 1 | Lower Beaton Rvr | 1,079 | 394,000 | OFI | Whole Year |
| C127223 | Canbriam Energy Inc | 2011.02.15 | 2012.01.12 | 2031.12.31 | Williston Lake | 1 | Peace Arm | 10,000 | 3,650,000 | OFI | Whole Year |
| C127986 | Nexen Inc | 2009.04.06 | 2012.03.11 | 2017.12.31 | North Tsea Lake | 1 | Tsea River | 60,000 | 2,500,000 | OFI | Apr 1 - Oct 31 |

WATER SOURCE WELLS

The Commission has authority through OGAA for groundwater management and the regulation of water source wells. Water Source Wells are defined in the Petroleum and Natural Gas Act as:

“[A] hole in the ground drilled to obtain water for the purpose of injecting water into an underground formation in connection with the production of petroleum or natural gas.”

All water source wells require a well authorization from the Commission. A permit holder must measure and record the quantity and rate of water produced from the permit holder’s water source well, and report

water production to the Commission monthly. Under Section 72 of the Drilling and Production Regulation:

“A permit holder must not operate a water source well in a manner that injuriously affects the use of the water source for domestic or agricultural purposes.”

“A well permit holder must report the quantity of water production from a water source well to the commission no later than 25 days after the end of the month in which the production occurred.”

TABLE 7:
COMPARISON
OF WATER
SOURCE WELL
WITHDRAWALS
FOR 2013

| DEPTH OF WATER SOURCE WELL | VOLUME OF WATER WITHDRAWN | | | TOTAL WELLS |
|----------------------------------|---------------------------|---------------------|-------------|----------------|
| | 0 - 10,000 m³ | 10,000 - 100,000 m³ | >100,000 m³ | |
| 20 - 200 m | 5 | 15 | 0 | 20 |
| 201 - 500 m | 4 | 4 | 0 | 8 |
| >500 m | 3 | 0 | 0 | 3 |
| TOTAL WELLS | 12 | 19 | 0 | 31 |

TABLE 8:
REPORTED WATER SOURCE WELL
WITHDRAWALS FOR 2013

In 2013, eight companies reported withdrawing 683,528 m³ of water from 31 water source wells (Table 1). The OGC Water Management Basins with the greatest groundwater extraction were Lower Sikanni Chief River (four wells, 171,201 m³) and Milligan Creek (six wells, 131,965 m³).

The location of active water source wells in 2013 in relation to unconventional gas play trends is provided in Appendix 1 on page 23. Several companies’ wells were outside the play trends. These companies include Ish Energy, Harvest Operations and Dejour Energy. They inject water into the subsurface for enhanced oil recovery. The three companies withdrew 266,635 m³ of water from water source wells (Table 6).

The rest of the water produced from water source wells in 2013 (416,893 m³) was used for hydraulic fracturing.

The depths of the water source wells ranged from 46 to 2,600 metres (Table 7). The median depth was 135 metres. The majority of wells (64.5 per cent) were located in shallow formations of 20 metres to 200 metres depth, and were likely extracting fresh water (516,255 m³). Eight wells (25.8 per cent) were located at an intermediary depth of 201 metres to 500 metres, and were likely extracting a mix of brackish water and saline water (156,783 m³). Three water source wells (9.7 per cent) extracted deep, saline water from depths greater than 500 metres (10,490 m³).

| MAJOR and Sub-Basin Name | WELL NUMBER | COMPANY | DEPTH OF WELL (m) | EASTING | NORTHING | 2013 WATER WITHDRAWAL (m³) |
|-------------------------------|-------------|--------------------------------|-------------------|---------|----------|----------------------------|
| BEATTON RIVER | | | | | | |
| Upper Beatton River | 26846 | Progress Energy Ltd | 80 | 525002 | 6325277 | 17,667 |
| Upper Beatton River | 26848 | Progress Energy Ltd | 46 | 543348 | 6319308 | 3,170 |
| Upper Beatton River | 26849 | Progress Energy Ltd | 105 | 542509 | 6319625 | 3,287 |
| Upper Beatton River | 26864 | Progress Energy Ltd | 98 | 543626 | 6318982 | 14,316 |
| Upper Beatton River | 27413 | Progress Energy Ltd | 49 | 538320 | 6323888 | 18,665 |
| Milligan Creek | 25370 | Canadian Natural Resources Ltd | 91 | 643081 | 6303882 | 17,635 |
| Milligan Creek | 25371 | Canadian Natural Resources Ltd | 152 | 641831 | 6305985 | 25,568 |
| Milligan Creek | 25373 | Canadian Natural Resources Ltd | 165 | 640056 | 6335748 | 35,786 |
| Milligan Creek | 26952 | Dejour Energy Ltd | 305 | 650759 | 6338188 | 6,953 |
| Milligan Creek | 27214 | Dejour Energy Ltd | 305 | 650809 | 6338207 | 26,536 |
| Milligan Creek | 27281 | Dejour Energy Ltd | 316 | 650723 | 6338251 | 19,487 |
| Lower Beatton River | 26962 | Canadian Natural Resources Ltd | 250 | 646044 | 6296253 | 14,621 |
| Lower Beatton River | 16332 | Pengrowth Energy Corporation | 140 | 637357 | 6262984 | 39,756 |
| Lower Beatton River | 25556 | Pengrowth Energy Corporation | 135 | 626822 | 6259069 | 21,841 |
| BEATTON TOTAL | | | | | | 265,287 |
| HALFWAY RIVER | | | | | | |
| Cameron River | 26240 | Progress Energy Ltd | 124 | 547270 | 6313457 | 800 |
| Cameron River | 27142 | Progress Energy Ltd | 49 | 555758 | 6303639 | 3,547 |
| Cameron River | 27813 | Progress Energy Ltd | 500 | 555087 | 6304225 | 18,543 |
| HALFWAY TOTAL | | | | | | 22,890 |
| HAY RIVER | | | | | | |
| Hay River | 12650 | Harvest Operations Corp | 116 | 666470 | 6508531 | 6,289 |
| Hay River | 12663 | Harvest Operations Corp | 263 | 666017 | 6508914 | 6,894 |
| Hay River | 25318 | Harvest Operations Corp | 55 | 663881 | 6499732 | 67,104 |
| Hay River | 25319 | Harvest Operations Corp | 103 | 665729 | 6507088 | 44,590 |
| HAY RIVER TOTAL | | | | | | 124,877 |
| KISKATINAW RIVER | | | | | | |
| Lower Kiskatinaw River | 7779 | Shell Canada Ltd | 1473 | 637696 | 6198391 | 220 |
| KISKATINAW RIVER TOTAL | | | | | | 220 |
| PEACE RIVER | | | | | | |
| Cache Creek | 3164 | Harvest Operations Corp | 66 | 585296 | 6268197 | 25,033 |
| Pouce Coupe River | 23533 | Tourmaline Oil Corp | 2600 | 669073 | 6205390 | 8,160 |
| PEACE TOTAL | | | | | | 33,193 |
| PETITOT RIVER | | | | | | |
| Sahdoanah River | 14893 | Ish Energy Ltd | 232 | 628010 | 6568548 | 61,381 |
| Sahdoanah River | 17557 | Ish Energy Ltd | 255 | 627989 | 6568704 | 2,368 |
| Tsea River | 25945 | Nexen Inc | 749 | 551298 | 6587792 | 2,111 |
| PETITOT TOTAL | | | | | | 65,860 |
| SIKANNI CHIEF RIVER | | | | | | |
| Lower Sikanni Chief River | 11449 | Canadian Natural Resources Ltd | 92 | 628676 | 6379191 | 14,322 |
| Lower Sikanni Chief River | 11499 | Canadian Natural Resources Ltd | 96 | 628415 | 6379606 | 67,485 |
| Lower Sikanni Chief River | 11500 | Canadian Natural Resources Ltd | 183 | 628004 | 6379264 | 47,537 |
| Lower Sikanni Chief River | 14995 | Canadian Natural Resources Ltd | 104 | 628436 | 6380161 | 41,857 |
| SIKANNI CHIEF RIVER | | | | | | 171,201 |
| TOTAL | | | | | | 683,528 |

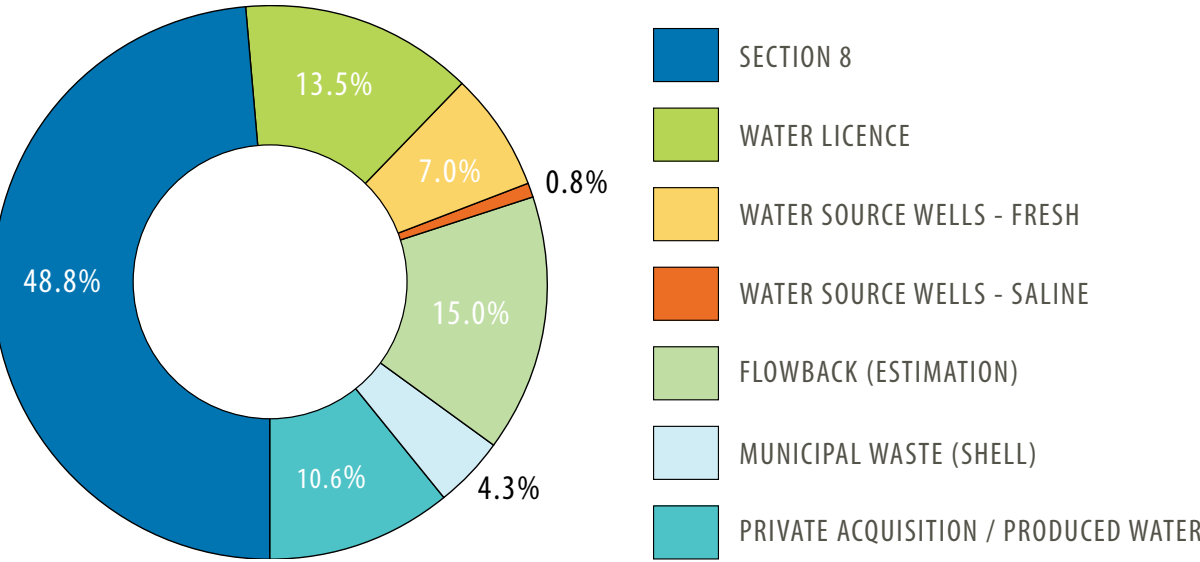
HYDRAULIC FRACTURING

WATER SOURCES AND REPORTING

On Jan. 1, 2012 British Columbia implemented the mandatory disclosure of ingredients used in hydraulic fracturing fluids. The website FracFocus.ca was launched to provide public access to information on fluids and ingredients used for the hydraulic fracturing of individual natural gas wells, as well as information on the process of hydraulic fracturing and the total volumes of water injected into the subsurface.

Hydraulic fracturing operations are closely monitored with related well data reported to the Commission; protection of surface water and groundwater are key priorities in the regulation of hydraulic fracturing.

FIGURE 2: SOURCES FOR ACQUISITION OF WATER USED FOR HYDRAULIC FRACTURING



In 2013, 31 companies used a total volume of 5,341,635 m³ of water to hydraulic fracture 433 wells (Table 1 on page 8).

The OGC Management Basin with the highest total volume of water used for hydraulic fracturing in 2013 was the Tsea River, which is located in the Horn River Basin (Appendix 2, page 24), with 732,631 m³ used for hydraulic fracturing of 10 wells. The next highest basins for hydraulic fracturing water use were the Kiwigana River (668,623 m³; seven wells) located in the Horn River Basin and the Cameron River (570,709 m³; 43 wells) which is located in the north Montney.

The amount of water used for hydraulic fracturing varies considerably across northeast B.C., with the lowest use per well in the Heritage Basin of the Montney Play (south of the Peace River) and the highest use in the Horn River Basin (Table 9 on page 19). The varying water requirements are largely dependent on the geology of the formation being fractured.

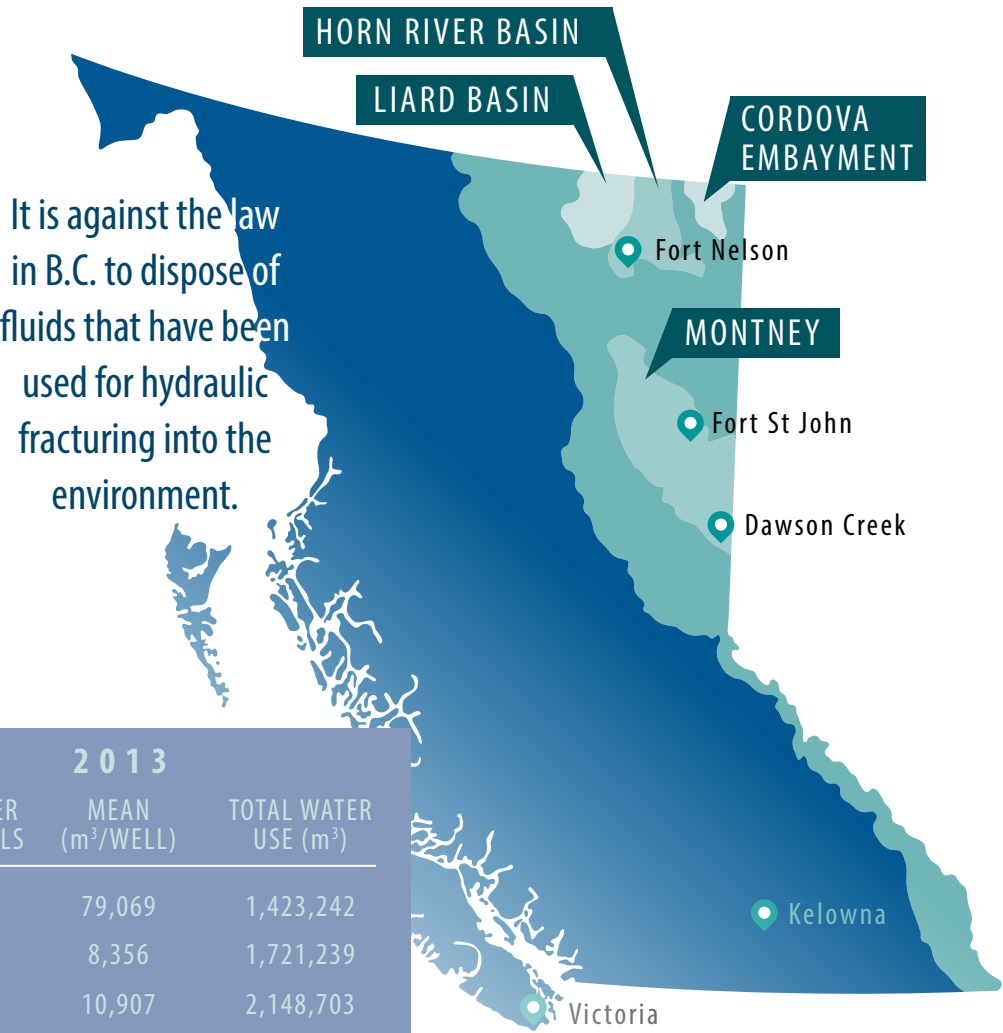
In 2013, the average water use was 8,356 m³/well (206 wells) in the Heritage Basin, 10,907 m³/well (197 wells) in the north Montney, 79,069 m³/well (18 wells) in the Horn River Basin, and 20,106 m³/well (1 well) in the Liard Basin. There were no hydraulically fractured wells in the Cordova Basin.

In previous years, watersheds in the Horn River Basin had the highest volume of water injected for hydraulic fracturing. There were significantly fewer hydraulically fractured wells in the Horn River Basin in 2013 (18 wells) as compared to 2012 (50 wells). The total volume of water used in hydraulic fracturing dropped by nearly one quarter from 2012 to 2013.

Approximately two-thirds of the water used for hydraulic fracturing in 2013 came from surface sources (rivers, lakes, water source dugouts). A further 31 per cent came from non-fresh water sources, including flowback reuse, municipal waste water reuse, and saline groundwater. The remaining seven per cent came from fresh water wells (Figure 2 on page 18).

| PLAY | 2012 | | | 2013 | | |
|--------------------|-----------------|----------------|----------------------|-----------------|----------------|----------------------|
| | NUMBER OF WELLS | MEAN (m³/WELL) | TOTAL WATER USE (m³) | NUMBER OF WELLS | MEAN (m³/WELL) | TOTAL WATER USE (m³) |
| HORN RIVER BASIN | 50 | 76,923 | 3,846,142 | 18 | 79,069 | 1,423,242 |
| MONTNEY - HERITAGE | 205 | 6,684 | 1,370,235 | 206 | 8,356 | 1,721,239 |
| MONTNEY - NORTH | 136 | 10,053 | 1,367,177 | 197 | 10,907 | 2,148,703 |
| LIARD BASIN | 1 | 144 | 144 | 1 | 20,106 | 20,106 |
| CORDOVA EMBAYMENT | 15 | 36,739 | 551,080 | 0 | | 0 |
| OTHER | 12 | 221 | 2,651 | 11 | 2,577 | 28,345 |
| TOTAL | 419 | 17,034 | 7,137,429 | 433 | 12,336 | 5,341,635 |

TABLE 9: WATER USED FOR HYDRAULIC FRACTURING IN 2012 AND 2013



COMMISSION INNOVATION

NORTHEAST WATER TOOL (NEWT)

The [NorthEast Water Tool \(NEWT\)](#) is a GIS-based hydrology decision-support tool developed by the Commission. It provides guidance on water availability across northeast B.C., and supports the decision-making process for water use approvals and licences. The Ministry of Forests, Lands and Natural Resource Operations, Foundry Spatial Ltd. and Geoscience BC partnered with the Commission on the project. It became publically available for use in October 2012.

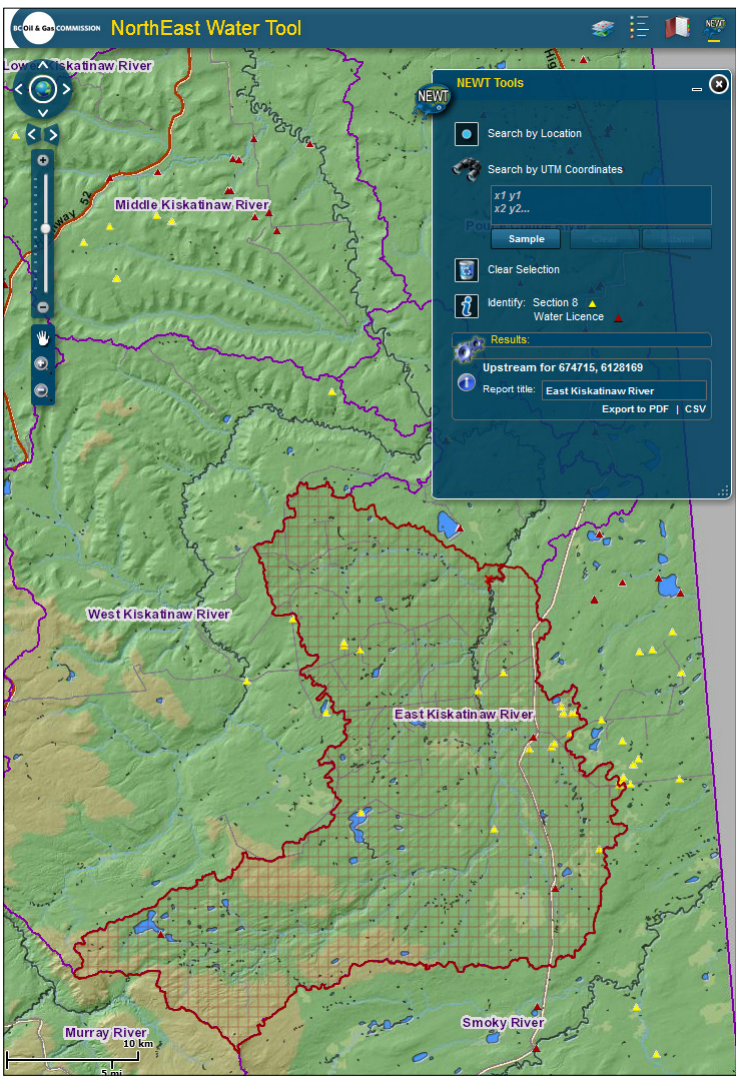
NEWT has an underlying hydrological information database, developed through a hydrology modelling project, and is designed to query locations on rivers or lakes throughout northeast B.C. to determine the monthly and annual average runoff at that location. This hydrology data represents the 30-year average (or “normal”) runoff. In addition, NEWT spatially displays and queries all active Section 8 approvals



and water licences issued pursuant to the Water Act, to quantify how much water is already allocated.

NEWT contains an “environmental flow” assessment, to ensure that all water allocation decisions do not impact environmental flow needs.

The basic output from NEWT is guidance on natural water supply and water availability, to assist decision-makers with water allocation determinations; it is just one piece of information that can be considered by a Statutory Decision Maker in making a water allocation determination. NEWT is publically accessible online for any interested parties and was acknowledged with a Premier’s Award for innovation in 2013.

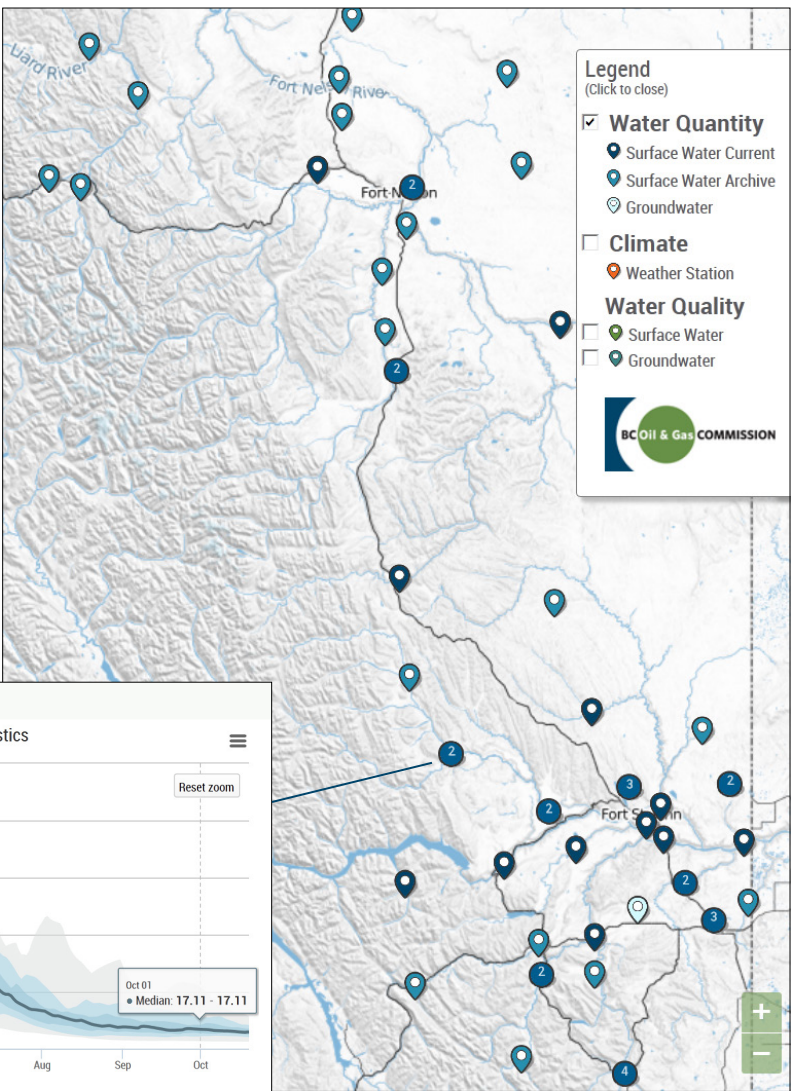
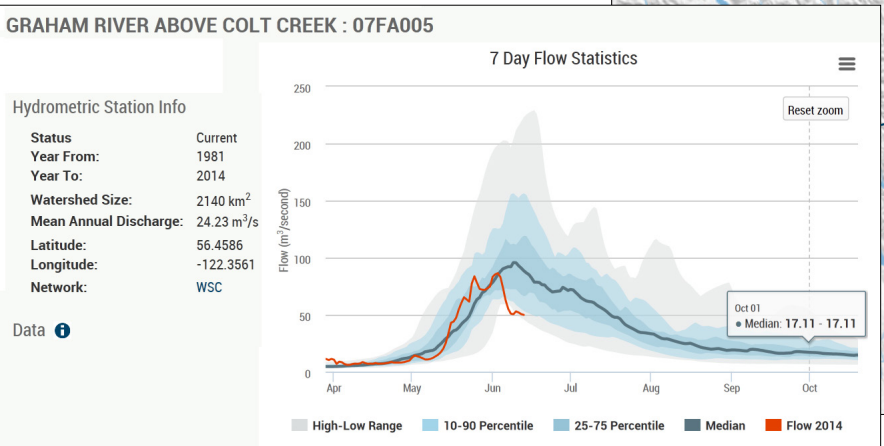


WATER INFORMATION PORTAL

The Commission in partnership with BC Ministry of Forests, Lands and Natural Resource Operations, Geoscience BC and the Science & Community Environmental Knowledge (SCEK) Fund, has recently developed a map-based [Water Information Portal](#).

This large repository of water monitoring information used by Commission decision-makers was mostly inaccessible and unknown to the public. The portal now offers the public access to relevant water information and provides enhanced knowledge of a wide range of water-related data from northeast B.C. to interested parties.

The data is displayed with flexible charts and analytical tools to assist users to understand and use the data for a variety of purposes.



The water-related data and information includes:

- **Streamflow information** collected by the Water Survey of Canada (and others, such as the Horn River Basin Producers Group).
- **Groundwater level** observation well data.
- **Climate information** collected by Environment Canada, Ministry of Transportation and Highways (from road weather stations), Ministry of Forests, Lands and Natural Resource Operations (from fire weather stations), BC Hydro, and others.
- **Surface water quality** data collected by government that is contained in the Provincial Environmental Monitoring System database.
- **Groundwater quality data** (from Northern Health, Ministry of Environment, and others).
- Data collected as a **permit requirement** from the Commission, or through investigations (streamflow, water quality).

GLOSSARY

Aquifer: An underground layer of permeable rock that can contain groundwater.

Basin Section 8: A Section 8 approval not for a specific point-of-diversion. Instead, it allows for withdrawals of up to 45 m3/day, to a maximum of 5,000 m3/year, specific to a drainage basin.

Brackish or Briny Water: Water with a salinity level between fresh water and saline water.

Dugout (Water Source Dugout): A pit used as a source of water that has naturally accumulated (from snowmelt, rainfall, or groundwater inflow).

Flowback Water: Water that returns to the surface after being injected for hydraulic fracturing.

Fresh Water: Water containing low concentrations of dissolved salts that may be suitable for drinking (before or after treatment).

Groundwater: Water located beneath the Earth's surface.

Groundwater Well: A well drilled for the purpose of obtaining water.

Hydraulic Fracturing: The injection of liquid at high pressure into the subsurface to fracture rock for the purpose of extracting oil or gas.

Hydrogeology: (hydro - meaning water, and - geology meaning the study of the Earth) is the area of geology that deals with the distribution and movement of groundwater in the soil and rocks of the Earth's crust (commonly in aquifers).

Hydrology: The study of the movement, distribution, and quality of water on Earth, including water resources and cycles, and environmental watershed sustainability.

m³: A measure of volume - cubic metres; 1m x 1m x 1m; 1,000 litres.

OGAA: The Oil and Gas Activities Act.

Points-of-Diversion: A location on the natural channel of a stream where an applicant proposes, or a licensee is authorized, to divert water from the stream.

Produced Water: Water that flows to the surface as a by-product of oil and gas production.

Runoff: The draining of water over a land surface.

Saline Water: Water containing a significant concentration of dissolved salts that is non-potable (not safe for consumption).

Section 8 Approval: A short-term water use approval issued under Section 8 of the Water Act for up to 24 months.

Stream: A natural watercourse or source of water supply, whether usually containing water or not, and a lake, river, creek, spring, ravine, swamp and gulch.

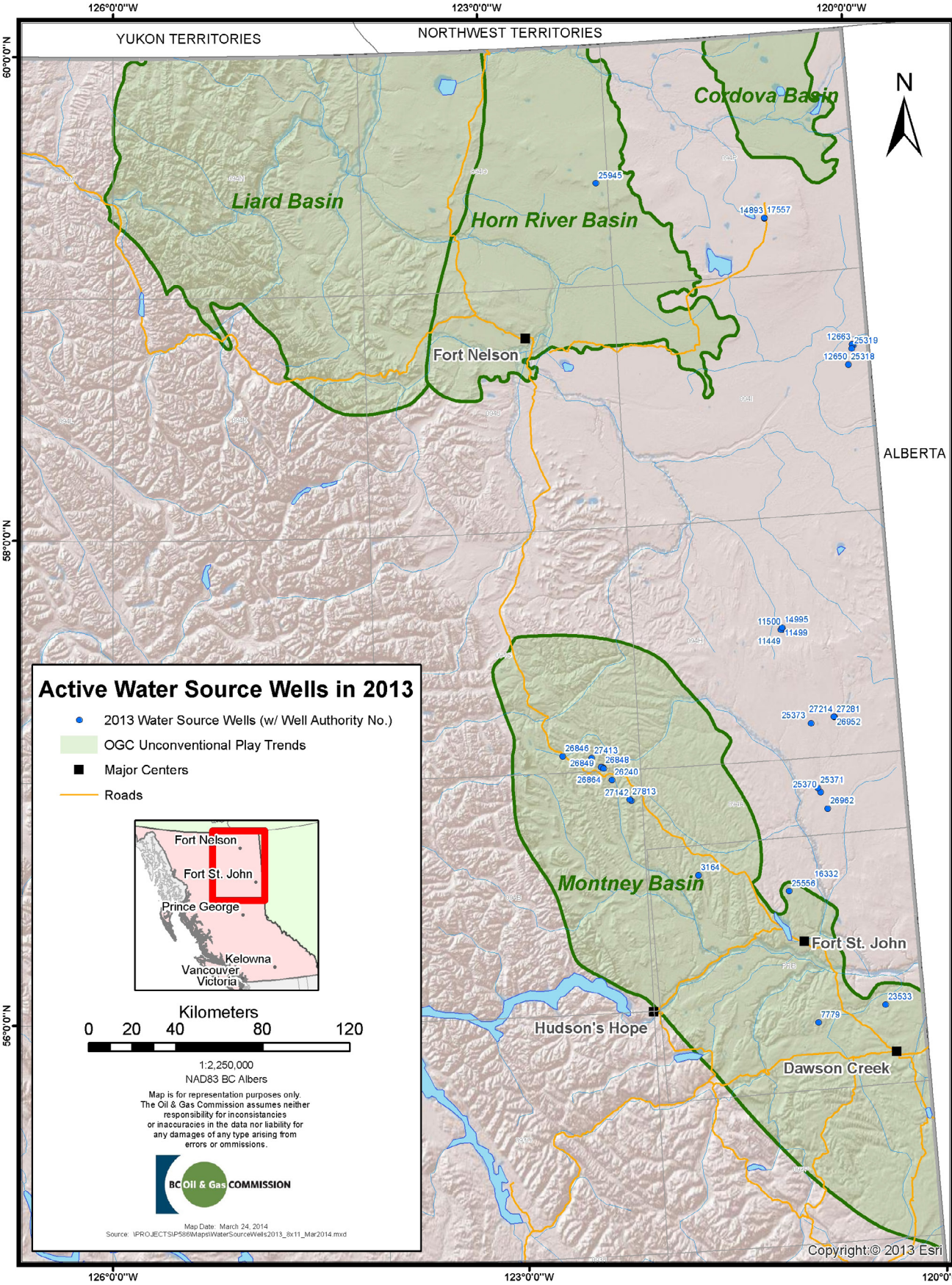
Water Act: The provincial legislation that establishes the provincial government as the “owner” of the water. Rights to use the water are established under licences or approvals issued under the Act.

Water Licence: The long-term authority to divert and use surface water in accordance with the statutory requirements of the Water Act.

Water Source Wells: A hole in the ground drilled to obtain water for the purpose of injecting water into an underground formation in connection with the production of petroleum or natural gas.

APPENDIX 1

MAP - ACTIVE WATER SOURCE WELLS IN 2013



APPENDIX 2

WATER APPROVAL AND USE FOR OIL AND GAS ACTIVITIES, ORGANIZED BY OGC WATER MANAGEMENT BASIN, IN 2013

Page 1 of 5

| MAJOR and Sub-Basin Name | SECTION 8 WATER USE APPROVALS BC OIL AND GAS COMMISSION | | | | | OIL AND GAS RELATED WATER LICENCES | | | NON OIL AND GAS WATER LICENCES - FLNRO | | | | WATER SOURCE SOURCE WELLS | | HYDRAULIC FRACTURING | |
|--|--|-------------------------------------|---|--------------------------------------|---|--|-------------------------------------|--|--|-------------------------------------|---|----------------------------------|------------------------------|--------------------------------------|-------------------------|-------------------------------------|
| | NUMBER OF APPROVED WITHDRAWAL LOCATIONS | TOTAL VOLUME APPROVED (m³) | TOTAL VOLUME APPROVED AS % of MEAN ANNUAL | TOTAL VOLUME WITHDRAWN (m³) | TOTAL VOLUME WITHDRAWN AS % OF MEAN ANNUAL RUNOFF | NUMBER OF LICENSED WITHDRAWAL LOCATIONS | TOTAL VOLUME LICENSED (m³) | TOTAL VOLUME LICENSED AS % of MEAN ANNUAL RUNOFF | NUMBER OF LICENCED WITHDRAWAL LOCATIONS | TOTAL VOLUME LICENCED (m³) | TOTAL VOLUME LICENCED as % of MEAN ANNUAL | MEAN ANNUAL RUNOFF (m³) | NUMBER OF WELLS | TOTAL VOLUME WITHDRAWN (m³) | NUMBER OF WELLS | TOTAL VOLUME INJECTED (m³) |
| BEATTON RIVER (sub-basin of Peace River) | | | | | | | | | | | | | | | | |
| Upper Beatton River | 37 | 794,354 | 0.160% | 190,412 | 0.040% | 0 | | | 0 | | | 499,408,440 | 5 | 57,104 | 40 | 473,522 |
| Middle Beatton River | 22 | 60,541 | | 4,526 | | 0 | | | 0 | | | 249,152,995 | 0 | | 1 | 4,723 |
| Middle Beatton Total (incl. Upper Beatton) | 59 | 854,895 | 0.114% | 194,938 | 0.026% | 0 | 0 | 0.000% | 0 | 0 | 0.000% | 748,561,435 | | | | |
| Milligan Creek | 17 | 271,326 | 0.140% | 565 | 0.000% | 0 | | | 0 | | | 191,536,686 | 6 | 131,965 | 1 | 0 |
| Blueberry River | 58 | 474,485 | 0.160% | 15,091 | 0.010% | 2 | 15,100 | 0.010% | 37 | 151,376 | 0.050% | 293,278,540 | 0 | | 21 | 113,600 |
| Doig River | 7 | 50,022 | 0.020% | 0 | 0.000% | 1 | 2,321,800 | 0.719% | 18 | 52,478 | 0.020% | 323,069,523 | 0 | | 0 | |
| Lower Beatton River | 3 | 10,110 | | 0 | | 1 | 394,000 | | 101 | 4,497,971 | | 138,262,629 | 3 | 76,219 | 0 | |
| BEATTON TOTAL | 144 | 1,660,837 | 0.098% | 210,594 | 0.012% | 4 | 2,730,900 | 0.161% | 156 | 4,701,825 | 0.277% | 1,694,708,813 | 14 | 265,287 | 63 | 591,845 |
| HALFWAY RIVER (sub-basin of Peace River) | | | | | | | | | | | | | | | | |
| Chowade River | 0 | | | | | 0 | | | 0 | | | 327,027,527 | 0 | | 0 | |
| Upper Halfway River | 10 | 287,980 | | 9,057 | | 0 | | | 15 | 142,707 | | 795,962,409 | 0 | | 1 | 9,699 |
| Upper Halfway Total (includes Chowade) | 10 | 287,980 | 0.026% | 9,057 | 0.001% | 0 | 0 | 0.000% | 15 | 142,707 | 0.013% | 1,122,989,936 | | | | |
| Graham River | 5 | 1,213,475 | 0.140% | 95,774 | 0.010% | 0 | | | 4 | 3,319 | 0.000% | 860,627,172 | 0 | | 0 | |
| Cameron River | 23 | 777,386 | 0.350% | 203,951 | 0.090% | 0 | | | 3 | 7,467 | 0.000% | 223,679,567 | 3 | 22,890 | 43 | 570,709 |
| Lower Halfway River | 28 | 1,955,204 | | 33,331 | | 0 | | | 26 | 1,040,751 | | 151,526,991 | 0 | | 18 | 241,969 |
| HALFWAY TOTAL | 66 | 4,234,044 | 0.179% | 342,113 | 0.015% | 0 | 0 | 0.000% | 48 | 1,194,243 | 0.051% | 2,358,823,666 | 3 | 22,890 | 62 | 822,377 |
| MOBERLY RIVER (sub-basin of Peace River) | | | | | | | | | | | | | | | | |
| Moberly River | 0 | | | | | 0 | | | 21 | 83,165 | 0.020% | 391,714,995 | 0 | | 0 | |
| MOBERLY TOTAL | 0 | 0 | 0.000% | 0 | 0.000% | 0 | 0 | 0.000% | 21 | 83,165 | 0.020% | 391,714,995 | 0 | 0 | 0 | 0 |
| PINE RIVER (sub-basin of Peace River) | | | | | | | | | | | | | | | | |
| Burnt River | 3 | 5,770 | 0.000% | 52 | 0.000% | 0 | | | 5 | 35,038 | 0.000% | 737,930,022 | 0 | | 0 | |
| Sukunka River | 7 | 6,172 | | 1,864 | | 0 | | | 11 | 121,502 | | 1,047,282,572 | 0 | | 0 | |
| Sukunka River Total (includes Burnt) | 10 | 11,942 | 0.001% | 1,916 | 0.000% | 0 | 0 | 0.000% | 16 | 156,540 | 0.009% | 1,785,212,594 | | | | |
| Upper Pine River | 3 | 1,500 | 0.000% | 384 | 0.000% | 0 | | | 29 | 2,455,557 | 0.170% | 1,466,884,035 | 0 | | 0 | |
| Murray River | 41 | 584,739 | 0.020% | 28,973 | 0.000% | 8 | 33,500 | 0.000% | 85 | 28,382,851 | 1.050% | 2,698,285,017 | 0 | | 3 | 22,654 |
| Lower Pine River | 40 | 535,003 | | 292,353 | | 0 | | | 36 | 5,576,562 | | 137,619,889 | 0 | | 67 | 552,323 |
| PINE TOTAL | 94 | 1,133,184 | 0.019% | 323,626 | 0.005% | 8 | 33,500 | 0.001% | 166 | 36,571,509 | 0.601% | 6,088,001,535 | 0 | 0 | 70 | 574,977 |

WATER APPROVAL AND USE FOR OIL AND GAS ACTIVITIES, ORGANIZED BY OGC WATER MANAGEMENT BASIN, IN 2013

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| MAJOR and Sub-Basin Name | SECTION 8 WATER USE APPROVALS BC OIL AND GAS COMMISSION | | | | | OIL AND GAS RELATED WATER LICENCES | | | NON OIL AND GAS WATER LICENCES - FLNRO | | | | WATER SOURCE SOURCE WELLS | | HYDRAULIC FRACTURING | |
|---|--|-------------------------------------|---|--------------------------------------|---|--|-------------------------------------|--|--|-------------------------------------|---|----------------------------------|------------------------------|--------------------------------------|-------------------------|-------------------------------------|
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| KISKATINAW RIVER (sub-basin of Peace River) | | | | | | | | | | | | | | | | |
| West Kiskatinaw River | 17 | 231,000 | 0.200% | 57,293 | 0.050% | 0 | | | 0 | | | 117,515,115 | 0 | | 3 | 54,892 |
| East Kiskatinaw River | 82 | 744,700 | 0.710% | 45,934 | 0.040% | 0 | | | 10 | 4,530,497 | 4.300% | 105,452,962 | 0 | | 3 | 11,320 |
| Middle Kiskatinaw River | 27 | 230,336 | | 11,385 | | 0 | | | 23 | 2,060,382 | | 56,347,972 | 0 | | 8 | 123,702 |
| Middle Kiskatinaw Total (incl. West & East) | 126 | 1,206,036 | 0.432% | 114,612 | 0.041% | 0 | 0 | 0.000% | 33 | 6,590,879 | 2.360% | 279,316,049 | | | | |
| Lower Kiskatinaw River | 9 | 279,772 | | 4,386 | | 1 | 400,000 | | 43 | 1,154,815 | | 89,659,847 | 1 | 220 | 62 | 480,537 |
| KISKATINAW TOTAL | 135 | 1,485,808 | 0.403% | 118,998 | 0.032% | 1 | 400,000 | 0.108% | 76 | 7,745,694 | 2.099% | 368,975,896 | 1 | 220 | 76 | 670,451 |
| PEACE RIVER | | | | | | | | | | | | | | | | |
| Peace Arm | 0 | | | | | 2 | 7,300,000 | N/A | 15 | 84,004 | N/A | N/A | 0 | | 0 | |
| Upper Peace River | 0 | | | | | 0 | | | 56 | 2,654,858 | 0.010% | 36,423,413,429 | 0 | | 4 | 55,579 |
| Lynx Creek | 1 | 1,500 | 0.000% | 0 | 0.000% | 0 | | | 9 | 259,970 | 0.850% | 30,436,635 | 0 | | 3 | 35,109 |
| Farrell Creek | 5 | 9,000 | 0.010% | 3,060 | 0.000% | 0 | | | 16 | 7,466 | 0.010% | 91,018,843 | 0 | | 21 | 227,189 |
| Cache Creek | 4 | 1,940 | 0.000% | 364 | 0.000% | 2 | 185,000 | 0.250% | 12 | 1,794,026 | 2.400% | 74,603,546 | 1 | 25,033 | 9 | 1,623 |
| Pouce Coupe River | 2 | 6,400 | 0.000% | 0 | 0.000% | 1 | 2,000 | 0.000% | 104 | 2,942,189 | 1.150% | 255,686,202 | 1 | 8,160 | 41 | 350,956 |
| Lower Peace River | 3 | 550,000 | | 0 | | 2 | 2,717,469 | | 62 | 123,642,746 | | 114,470,012 | 0 | | 17 | 117,627 |
| PEACE TOTAL (incl. Kisk/Pine/Moberly/Half/Beatton) | 454 | 9,082,713 | 0.019% | 998,755 | 0.002% | 20 | 13,368,869 | 0.028% | 741 | 181,681,695 | 0.379% | 47,891,853,572 | 20 | 321,590 | 366 | 3,447,733 |
| SMOKY RIVER | | | | | | | | | | | | | | | | |
| Smoky River | 63 | 533,800 | 0.020% | 2,920 | 0.000% | 3 | 27,500 | 0.000% | 15 | 69,944 | 0.000% | 2,669,506,123 | 0 | | 2 | 7,228 |
| SMOKY TOTAL | 63 | 533,800 | 0.020% | 2,920 | 0.000% | 3 | 27,500 | 0.000% | 15 | 69,944 | 0.000% | 2,669,506,123 | 0 | 0 | 2 | 7,228 |
| MUSKWA RIVER (sub-basin of Fort Nelson River) | | | | | | | | | | | | | | | | |
| Upper Muskwa River | 0 | | | | | 0 | | | 0 | | | 1,725,201,511 | 0 | | 0 | |
| Middle Muskwa River | 0 | | | | | 0 | | | 1 | 830 | | 1,973,711,816 | 0 | | 0 | |
| Middle Muskwa Total (incl. Upper Muskwa) | 0 | 0 | 0.000% | 0 | 0.000% | 0 | 0 | 0.000% | 1 | 830 | 0.000% | 3,698,913,327 | | | | |
| Lower Muskwa River | 0 | | | | | 0 | | | 10 | 1,839,377 | 0.280% | 646,841,560 | 0 | | 0 | |
| MUSKWA TOTAL | 0 | 0 | 0.000% | 0 | 0.000% | 0 | 0 | 0.000% | 11 | 1,840,207 | 0.042% | 4,345,754,887 | 0 | 0 | 0 | 0 |

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| PROPHET RIVER (sub-basin of Fort Nelson River) | | | | | | | | | | | | | | | | |
| Upper Prophet River | 5 | 65,357 | 0.000% | 24,502 | 0.000% | 0 | | | 0 | | | 1,470,271,289 | 0 | | 9 | 89,157 |
| Middle Prophet River | 9 | 12,411 | | 5,208 | | 0 | | | 0 | | | 621,428,680 | 0 | | 0 | |
| Middle Prophet Total (incl. Upper Prophet) | 14 | 77,768 | 0.004% | 29,710 | 0.001% | 0 | 0 | 0.000% | 0 | 0 | 0.000% | 2,091,699,969 | | | | |
| Lower Prophet River | 5 | 19,196 | | 1,045 | | 0 | | | 0 | | | 272,262,427 | 0 | | 0 | |
| PROPHET TOTAL | 19 | 96,964 | 0.004% | 30,755 | 0.001% | 0 | 0 | 0.000% | 0 | 0 | 0.000% | 2,363,962,396 | 0 | 0 | 9 | 89,157 |
| SIKANNI CHIEF RIVER (sub-basin of Fort Nelson R.) | | | | | | | | | | | | | | | | |
| Upper Sikanni Chief River | 6 | 892,577 | 0.110% | 708,387 | 0.088% | 0 | | | 2 | 64,488 | 0.008% | 807,771,692 | 0 | | 5 | 69,317 |
| Middle Sikanni Chief River | 37 | 357,197 | | 19,597 | | 0 | | | 2 | 5,808 | | 949,755,794 | 0 | | 22 | 256,507 |
| Middle Sikanni Chief Total (incl. Upper Sikanni Chief) | 43 | 1,249,774 | 0.071% | 727,984 | 0.041% | 0 | 0 | 0.000% | 4 | 70,296 | 0.004% | 1,757,527,486 | | | | 325,824 |
| Lower Sikanni Chief | 42 | 111,884 | | 2,882 | | 0 | | | 0 | | | 875,678,142 | 4 | 171,201 | 0 | |
| SIKANNI CHIEF TOTAL | 85 | 1,361,658 | 0.052% | 730,866 | 0.028% | 0 | 0 | 0.000% | 4 | 70,295 | 0.003% | 2,633,205,628 | 4 | 171,201 | 27 | 325,824 |
| FORT NELSON RIVER | | | | | | | | | | | | | | | | |
| Kahntah River | 65 | 244,654 | 0.060% | 20,733 | 0.010% | 0 | | | 0 | | | 400,582,903 | 0 | | 0 | |
| Fontas River | 36 | 184,032 | | 18,719 | | 0 | | | 0 | | | 591,531,903 | 0 | | 0 | |
| Fontas Total (includes Kahntah) | 101 | 428,686 | 0.043% | 39,452 | 0.004% | 0 | 0 | 0.000% | 0 | 0 | 0.000% | 992,114,806 | | | | |
| Klua River | 8 | 34,000 | 0.010% | 2,894 | 0.000% | 0 | | | 0 | | | 402,135,448 | 0 | | 0 | |
| Upper Fort Nelson River | 15 | 67,729 | | 4,563 | | 0 | | | 0 | | | 276,181,026 | 0 | | 6 | 9,459 |
| Upper Fort Nelson Total (incl. Sikanni Chief | | | | | | | | | | | | | | | | |
| Total, Kahntah, Fontas, Klua) | 209 | 1,892,073 | 0.044% | 777,775 | 0.018% | 0 | 0 | 0.000% | 4 | 70,295 | 0.002% | 4,303,636,908 | | | | |
| Snake River | 21 | 84,550 | 0.030% | 9,802 | 0.000% | 0 | | | 0 | | | 310,763,522 | 0 | | 0 | |
| Sahtaneh River | 57 | 461,239 | 0.100% | 9,050 | 0.000% | 2 | 40,000 | 0.010% | 0 | | | 474,904,729 | 0 | | 0 | |
| Middle Fort Nelson River | 56 | 2,055,200 | | 729,328 | | 0 | | | 7 | 1,001,848 | | 515,348,901 | 0 | | 0 | |
| Mid Ft Nelson Total (incl. Upper Ft. Nelson total, | | | | | | | | | | | | | | | | |
| Muskwa Total, Prophet Total, Snake, Sahtaneh) | 362 | 4,590,026 | 0.037% | 1,556,710 | 0.013% | 2 | 40,000 | 0.000% | 22 | 2,912,350 | 0.024% | 12,314,371,343 | | | | |
| Kiwigana River | 52 | 1,058,305 | 0.240% | 4,449 | 0.000% | 6 | 142,500 | 0.030% | 0 | | | 441,657,543 | 0 | | 7 | 668,623 |
| Lower Fort Nelson River | 27 | 363,659 | | 32,734 | | 0 | | | 0 | | | 312,768,938 | 0 | | | |
| FORT NELSON TOTAL | 441 | 6,011,990 | 0.046% | 1,593,893 | 0.012% | 8 | 182,500 | 0.001% | 22 | 2,912,350 | 0.022% | 13,068,797,824 | 0 | 0 | 49 | 1,093,063 |

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| LIARD RIVER | | | | | | | | | | | | | | | | |
| Muncho River | 0 | | | | | 0 | | | | | | 551,551,360 | | | | |
| Upper Liard River | 0 | | | | | 0 | | | 3 | 7,190 | 0.000% | 33,125,817,465 | 0 | | 0 | |
| Upper Liard Total (incl. Muncho) | 0 | 0 | 0.000% | 0 | 0.000% | 0 | 0 | 0.000% | 3 | 7,190 | 0.000% | 33,677,368,825 | 0 | 0 | 0 | 0 |
| Grayling River | 0 | | | | | 0 | | | 0 | | | 630,833,914 | 0 | | 0 | |
| Upper Toad River | 0 | | | | | 0 | | | 0 | | | 1,521,055,576 | 0 | | 0 | |
| Racing River | 0 | | | | | 0 | | | 0 | | | 1,488,336,681 | 0 | | 0 | |
| Lower Toad River | 0 | | | | | 0 | | | 0 | | | 419,472,722 | 0 | | 0 | |
| Beaver River | 0 | | | | | 0 | | | 0 | | | 10,862,659,426 | 0 | | 0 | |
| Middle Liard River | 0 | | | | | 0 | | | 0 | | | 463,652,312 | 0 | | 0 | |
| Middle Liard (incl. Upper Liard Total, Grayling, Upper Toad, Racing, Lower Toad, Beaver) | 0 | 0 | 0.000% | 0 | 0.000% | 0 | 0 | 0.000% | 3 | 7,190 | 0.000% | 49,063,379,456 | 0 | 0 | 0 | 0 |
| Capot-Blanc Creek | 23 | 447,708 | 0.240% | 4,203 | 0.000% | 0 | | | 0 | | | 183,879,851 | 0 | | 1 | 20,106 |
| Dunedin Rlver | 38 | 207,949 | 0.030% | 1,908 | 0.000% | 0 | | | 0 | | | 820,464,167 | 0 | | 0 | |
| Lower Liard River | 29 | 723,600 | | 119,578 | | 0 | | | 0 | | | 1,236,634,664 | 0 | | 0 | |
| LIARD TOTAL (incl. Fort Nelson) | 531 | 7,391,247 | 0.011% | 1,719,582 | 0.003% | 8 | 182,500 | 0.000% | 25 | 2,919,540 | 0.005% | 64,373,155,962 | 0 | 0 | 50 | 1,113,169 |
| PETITOT RIVER | | | | | | | | | | | | | | | | |
| Sahdoanah River | 71 | 606,395 | 0.240% | 5,814 | 0.000% | 0 | | | 1 | 830 | 0.000% | 252,625,362 | 2 | 63,749 | 0 | |
| Upper Petitot River | 81 | 245,716 | 0.020% | 23,816 | 0.000% | 0 | | | 0 | | | 1,476,579,488 | 0 | | 0 | |
| Tsea River | 28 | 115,902 | 0.030% | 29,891 | 0.010% | 4 | 2,590,976 | 0.600% | 0 | | | 434,062,484 | 1 | 2,111 | 10 | 732,631 |
| Middle Petitot River | 19 | 55,050 | | 13,832 | | 2 | 26,666 | | 0 | | | 698,562,753 | 0 | | 0 | |
| Middle Petitot Total (incl. Sahdoanah, Upper Petitot, Tsea) | 199 | 1,023,063 | 0.036% | 73,353 | 0.003% | 6 | 2,617,642 | 0.091% | 1 | 830 | 0.000% | 2,861,830,087 | | | | |
| Lower Petitot River | 36 | 619,534 | | 23,583 | | 1 | 30,000 | | 0 | | | 904,314,069 | 0 | | 1 | 21,988 |
| PETITOT TOTAL | 235 | 1,642,596 | 0.044% | 96,936 | 0.003% | 7 | 2,647,642 | 0.070% | 1 | 830 | 0.000% | 3,766,144,156 | 3 | 65,860 | 11 | 754,619 |

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| HAY RIVER | | | | | | | | | | | | | | | | | |
| | Upper Kotcho River | 19 | 55,007 | 0.020% | 2,034 | 0.000% | 0 | | | 0 | | | 311,519,217 | 0 | | 0 | |
| | Kyklo River | 29 | 179,016 | 0.120% | 5,574 | 0.000% | 0 | | | 1 | 5,808 | 0.000% | 145,897,691 | 0 | | 0 | |
| | Shekilie River | 42 | 104,079 | 0.020% | 4,392 | 0.000% | 0 | | | 0 | | | 450,747,494 | 0 | | 3 | 1,369 |
| | Lower Kotcho River | 11 | 44,400 | | 441 | | 0 | | | 0 | | | 311,519,217 | 0 | | 0 | |
| | Lower Kotcho Total (includes Upper Kotcho, Kyklo, Shekilie) | 101 | 382,502 | 0.031% | 12,441 | 0.001% | 0 | 0 | 0.000% | 1 | 5,808 | 0.000% | 1,219,683,619 | | | | |
| | Hay River | 33 | 224,806 | | 63,089 | | 0 | | | 0 | | | 538,672,352 | 4 | 124,877 | 1 | 17,517 |
| | HAY TOTAL | 134 | 607,308 | 0.035% | 75,530 | 0.004% | 0 | 0 | 0.000% | 1 | 5,808 | 0.000% | 1,758,355,971 | 4 | 124,877 | 4 | 18,886 |
| CHINCHAGA RIVER | | | | | | | | | | | | | | | | | |
| | Chinchaga River | 31 | 157,212 | 0.140% | 3,114 | 0.000% | 0 | | | 0 | | | 109,492,680 | 0 | | 0 | |
| | CHINCHAGA TOTAL | 31 | 157,212 | 0.140% | 3,114 | 0.000% | 0 | 0 | 0.000% | 0 | 0 | 0.000% | 109,492,680 | 0 | 0 | 0 | 0 |
| OTHER (outside Northeast B.C.) | | 41 | 8,965 | | 28 | | 0 | 0 | | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| | GRAND TOTAL | 1,489 | 19,423,842 | 0.016% | 2,896,865 | 0.002% | 38 | 16,226,511 | 0.013% | 783 | 184,677,818 | 0.160% | 120,568,508,464 | 31 | 683,528 | 433 | 5,341,635 |
| | | | | | | | | | | | | | | | | | |