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RAMP

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## Regional Aquatics Monitoring Program

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## Land Change

Oil sands developments can affect aquatic ecosystems directly, through additions or withdrawals of water, and indirectly, through changes to the landscape that affect natural patterns of water movement. Changes to the landscape within drainage basins are used to [classify sampling stations](#) as baseline or test.

The extent of land disturbance in each drainage basin is estimated using satellite imagery in conjunction with detailed maps of operations provided by RAMP industry members. As of 2012, approximately 106,100 hectares (3.0%) of land within the RAMP Focus Study Area had been disturbed by RAMP and non-RAMP member companies. The percentage of land disturbed within each basin varies from less than 1% (e.g., the MacKay, Ells, Christina, and Firebag basins) to more than 10% (e.g., Muskeg River, Fort Creek, Shipyard Lake, McLean Creek, and the Tar River). Estimates of land disturbance are used to assess the relevance of observed differences in measurement endpoints between different drainage basins.

Developed areas where there is no natural exchange of water with the rest of the watershed (e.g. tailings ponds) are designated as **hydrologically closed-circuited**. Developed areas where there is natural exchange of water with the rest of the watershed (e.g. cleared land) are designated as **not hydrologically closed-circuited**. The land change classification protocol used to classify areas is described in [Appendix A](#) of the Annual Technical Reports.

## Land change maps

Annual Land Disturbance Maps are included in the [online monitoring locations map](#).

## Area of watersheds with land change in 2012

Watershed	Total Watershed Area (ha)	Watershed Area with Land Change in 2012 (ha)						Watershed Total
		Focal Projects		Other Oil Sands Projects in RAMP FSA		Total		
		Not-Closed Circuited	Closed-Circuited	Not-Closed Circuited	Closed-Circuited	Not-Closed Circuited	Closed Circuited	
Minor Athabasca River Tributaries	160,730	7,423	30,715			7,423	30,715	38,137
Calumet	17,354	130	68			130	68	198
Christina	1,303,805	6,507	785	158		6,665	785	7,450
Ells	245,000	2,273	342			2,273	342	2,614
Firebag	568,174	3,995	1,360			3,995	1,360	5,355
Fort Creek	3,193	2,042	33			2,042	33	2,075
Hangingstone	106,641	9	47			9	47	56
Horse	215,741	232	38	163	76	395	114	509
MacKay	557,000	3,185	619			3,185	619	3,804
McLean	4,712	146	1,109			146	1,109	1,255
Muskeg	146,000	8,854	12,619			8,854	12,619	21,473
Original Poplar	13,856	182	310			182	310	492
Steepbank	135,491	4,529	488			4,529	488	5,017
Tar	33,261	1,248	9,576	12		1,248	9,576	10,825
Upper Beaver	28,711	861	1,928			861	1,928	2,790
FSA Total	3,544,606	41,688	64,013	322	76	42,009	64,089	106,098

Table Notes:

## Interactive Features

[Monitoring locations map](#)

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- Only land changes within the RAMP FSA were delineated.
- Refers to Athabasca River tributaries from Fort McMurray to the mouth of the Firebag River excluding the watersheds explicitly listed in this table. All land change areas in the minor Athabasca River tributaries in 2012 were upstream of RAMP hydrology station S24.
- Original Poplar refers to the Poplar Creek watershed prior to the Beaver Creek diversion, while "Upper Beaver" refers to that part of the Beaver Creek drainage that now drains into Poplar Creek as a result of the Beaver Creek diversion. Drainage boundaries were estimated from maps provided in Syncrude Canada Ltd. (1977).

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