

2. As conventional sources of crude oil are depleted, unconventional sources such as oil sands (also known as tar sands) are being utilized. Oils sands contain bitumen, which can be processed into a synthetic crude oil. A region of boreal forest in Alberta, Canada, that covers a deposit of oil sands will be cut and removed during the process of bitumen extraction. It is estimated that the deposit contains 73 billion barrels of recoverable bitumen. The rate of extraction from the deposit will be approximately 1 million barrels of bitumen per day.
- (a) **Identify** one ecological benefit, other than providing habitat, that is provided by forests.
 - (b) **Identify** one economic benefit that is provided by forests.
 - (c) **Describe** TWO environmental consequences, other than those related to the loss of boreal forest habitat, that result from the extraction of bitumen or the transportation of synthetic oil to customers.
 - (d) Assuming the above extraction rate, **calculate** how many days will be needed to extract the recoverable volume of bitumen from the oil sands.
 - (e) **Calculate** how many years will be needed to fully extract the recoverable volume of bitumen from the oil sands.
 - (f) Monthly production of synthetic crude oil is 30 million barrels. Producing one barrel of synthetic crude oil uses two barrels of heated freshwater. **Calculate** the number of barrels of freshwater needed each year to supply this demand.