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Economic feasibility of using small barges on the B.C. coast

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By:

Rob Jokai, Principal Technologist, Transport and Energy

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REVIEWERS

James Sinnett, Associate Program Leader
Transport and Energy

CONTACT

Rob Jokai, Principal Technologist
Transport and Energy
604 222-5694
rob.jokai@fpinnovations.ca

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BACKGROUND

The B.C. coastal forest industry relies heavily on water transport for the movement of logs. Logs are traditionally made into bundle booms or loaded onto barges and are towed by tug boats to sort yards or docks, or to mills for processing. This method of transport has been preferred due to its cost-effectiveness, given the unique and challenging terrain of the coast. However, by transporting logs in water, additional cost is incurred in the mill due to corrosion of equipment from salt water. Further, it is more challenging to find uses for, and to dispose of, salt-laden mill residuals, such as hog fuel.

Previous work done by FPInnovations compared different modes of log transport: truck, boom, and small and large barge on a hypothetical trip from Campbell River to Nanaimo. The study found that when both direct and indirect costs are included, transporting logs by small barge and keeping them out of salt water is the most economical means of transport. Operations south of Cape Caution, which is on the east side of Vancouver Island, and the west coast of mainland B.C., could potentially replace log booms with small barges, should it be more economical to do so. The original report compared truck transport to water transport. The current report will solely focus on comparing the costs and operational implications of switching from log booms to small barges.

OBJECTIVES

The objectives of this project are to:

- Determine whether replacing log booms with small barges is a more economical means of transporting logs, not only to on mills on Vancouver Island, but to those on the Fraser River as well.
- Identify operational issues that may be encountered by switching from boom to barge transport, and to better understand the role that salt plays in log value and mill operations.

METHODOLOGY

Several meetings were held with forest companies that have operations on Vancouver Island and the coastal mainland to gain their views on whether it could be more economical to replace their booming operations with small barges. In addition to these meetings, discussions were held with towing companies to better understand the cost and operational implications of switching from booming to barging.

The meetings were focused on reviewing the report *Evaluate the Costs and Benefits of Water Transportation versus Truck-Based Transportation of Logs on the BC Coast* (Clark, 2011) and the assumptions made in the report. The report concluded that when indirect costs are taken into consideration, the cheapest form of log transport on a hypothetical trip from Campbell River to Nanaimo was by small barge. The stakeholder interviews focused on determining the validity of the assumptions made in the report and whether potential savings can be achieved on other towing routes as well, such as from Vancouver Island to the Fraser River. The interviews also focused on identifying any operational challenges that would be encountered by keeping logs out of the water by switching from

booming to barging, and to try to better understand the total cost that salt has on mill operations and log value.

RESULTS

Operational considerations

Salt contamination

One of the biggest problems identified during the interviews was selling or disposing of hog fuel that has been contaminated by salt water. Regulations in the U.S. do not allow the importation of hog fuel that has been exposed to salt water, due to the dioxins emitted in the exhaust fumes during burning. In Canada, the same restrictions do not exist, but this could potentially change in the future. Salt also causes corrosion problems in the boilers, and while many confirmed that this is a problem, none of those interviewed were able to state how much it increases boiler repair and maintenance costs. One of the key benefits of transporting logs by barge is that any hog fuel generated is salt-free. However, while this is a problem, it was felt by those who were interviewed that transporting logs by barge instead of boom to avoid salt-contaminated hog fuel may not justify the extra costs. It was generally felt that keeping logs out of the water, either salt or fresh, would be very difficult and costly with the existing infrastructure.

Some companies that export logs debark them at the sort yard or port before loading them onto a ship. By removing the bark and the weight associated with it, the ship can carry larger payloads, and the operational efficiency of the shipping process is improved. Not all ports allow ships to unload or even tie up if they are carrying logs with the bark intact. Many coastal operations truck the wood to a central sort yard for processing. For these operations, debarking logs as part of the log manufacturing process may be an option. The debarked logs can then be put into the water and transported by boom. The energy content of hog fuel is dependent on many variables, one key variable being moisture content. Hog fuel from logs that have not been in water should have a lower moisture content, thus a higher-energy content, and be more desirable than hog fuel from logs that have been in water. The salt-free hog fuel could potentially be made into higher-value products as well, such as bark mulch.

Salt corrosion at mills

The personnel who were interviewed generally worked with the woodlands or logistics departments for their respective companies, so they were not able to estimate the costs that the mills incur due to salt. However, they felt that if salt-free logs are a significant benefit to the mill, then this should be reflected in higher log value, since buyers should be willing to pay slightly more for logs that have not been exposed to salt water. While this may sound logical, none of those interviewed felt that customers would pay more for a log that was not exposed to salt water. Therefore, whether a log was transported by barge or boom, the mode of transport or exposure to salt water would not impact log value.

A better understanding of how salt is absorbed by logs and the resulting costs on mill infrastructure is needed so that other options involving logs being kept out of salt water could be explored. While transport costs for barging may be more than for booming, indirect costs, such as salt contamination, need to be better understood.

Log loss

Most people who were interviewed felt that log loss was not a big problem or cost. While some loss occurs, the lost logs are generally lower-value, small-diameter, second-growth hemlock. The potential for log loss is decreased dramatically when logs are bundled together and then put into a boom, which is how almost all booms are built (Figure 1).On rare occasions, bundle wires break and some of the heavier logs can sink. It seemed quite common for companies to build bundles that are made from mixed species. Combining the heavier hemlock logs with those that are more buoyant, such as cedar, improves the flotation of the bundle. In addition, some companies allow logs to dry in the bush before transporting them, further improving buoyancy.

Figure 1. Bundle booms stored in the Fraser River.

Log storage and transport

Most mills operating in the lower mainland area are not set up for barge deliveries; they are designed to take log deliveries from the water. While it may be possible to change the infeed system so these mills can accept deliveries from barges, the cost to make these changes is unknown. Mills that are located along waterways generally store their log inventory in boom form (Figure 2), with each section of a boom containing about 250 to 300 m^3 of logs. One coastal operator stated that inventory for one of their mills can range from 10 000 to 30 000 m^3 and is stored in boom form close to the sawmill. Figure 1 shows log stored in boom form, in both salt water and in fresh water in the Fraser River. Switching to barge transport (Figure 3) would require logs to be stored either on the barge or on land. However, mill inventory levels could be reduced from current levels, since barge transport is more reliable and faster than boom transport.

Figure 2. Boom storage in salt water (left) and in booming grounds in the Fraser River (right).

Photo courtesy of West Coast Tug and Barge.

Figure 3. Barge transporting logs

Booms can have as many as 72 sections and can contain many different sorts, each sort having its own section. Logs within a boom can be delivered to multiple customers along the tow route, since each customer can have their own section(s). With barges, it is difficult to have multiple sorts contained within a barge or to deliver to different customers by a single barge since there are no separate compartments for different customers or sorts.

The transport time for boom from Campbell River to the Fraser River is about 2½ days, and that is without any weather delays. With barge transport, the time is reduced to 12 hours. Inclement weather is an issue, and winds higher than 8 knots are considered excessive for towing a log boom, whereas for barge transport, winds of this magnitude are still acceptable. Travel speed for barge towing is about

8 knots, while for boom it is 1½ to 2 knots. Once booms get to the mouth of the Fraser River, tides and water levels can play a role. During winter runoff, when water levels are high, extra tugs are added to move the boom upriver, which increases costs. For barges, extra tugs are not required, but the speeds at which they can travel are reduced.

Loading at logging site

Many coastal logging sites are isolated and rely on water transport to move logs to a sort yard. Generally, logs are trucked down to the foreshore, where they are dumped into the water and made into booms, and stored until there is sufficient volume to complete the boom. Trucks are unloaded by tripping the stakes, and the bundles are dumped into the water.

A small barge has a capacity in the 5 000 to 8 000 m^3 range. At remote settings, logs must unloaded at the foreshore and stored until there is sufficient volume to call in a barge. The barge can be loaded from the stockpiled volume and directly from trucks. This results in some of the log bundles or logs being handled twice before they are loaded onto the barge, which not only increases costs, but log damage as well. It is unknown whether it is more efficient to load the barge directly from the trucks, having the barge stand by all the time, or to stockpile and bring the barge in once there is sufficient volume to fill it.

Barges must be anchored in an area deep enough such that they are always floating yet close enough to shore so they can be loaded, which can be challenging with large tidal fluctuations. Some barges are equipped with their own loading ramp, as shown in Figure 4.

Photo courtesy of West Coast Tug and Barge.

Figure 4. Barge loading.

Costs of barging versus booming

This study did not involve the development of a detailed cost model that compares barging to booming; the cost information in this report was provided during interviews. Based on these interviews, the general consensus is that in most cases, moving logs by boom is the most cost-effective method of transport. During one interview, it was stated that for a trip from Menzies Bay to the Fraser River cost $\$2.80/m^3$ by boom and $\$12/m^3$ by barge. These costs are direct towing costs and do not include any indirect costs, such as those incurred from salt water. However, it was also noted that using small barges may be more cost-effective in certain situations, such as when an established booming ground does not exist. With environmental restrictions, it can be difficult to get approval for new booming grounds, and even if approval were granted, it could be a lengthy process. Under these circumstances, it may be more time- and cost-effective to load the wood onto a small barge and take the logs to a sort yard or unload them at a nearby booming ground to be made into booms. In one example stated, a barge was used to load the wood, which was taken a few kilometres to the nearest booming ground, unloaded, and made into booms for transport to the sort yard.

The trucking industry tries to avoid empty travel by picking up extra loads for the return trip home. On long trips, rather than a truck returning empty to base, a load waiting for delivery is often found. This helps reduce costs by generating revenue for what would normally be the unpaid portion of the cycle, and the same logic may apply to barging. Barges can transport logs in one direction and then move equipment or some other cargo on the return trip. This would reduce costs, and some of these savings would be passed onto the customer in lower log-barging costs. However, extensive planning would be required to ensure that the delivery and pick-up schedules meet the needs of the different customers.

CONCLUSION

From the company interviews, the general consensus is that transporting logs by boom is less expensive than by barge. Barging is more reliable than booming and does have the potential to reduce inventory levels, which could offer some savings, but it is unknown whether the savings are enough to make it more economical. However, for mills to even consider moving logs by barge they must modify their infeed systems to take logs from a barge and store them on land; otherwise, delivering directly from a barge is not possible. It is not possible, at this point, to conclusively state where barging may be cheaper than booming, or by how much. At some remote coastal sites, where timber harvest volumes are small and booming ground approval or construction is problematic, barging may be the preferred alternative for log transport.

RECOMMENDATIONS

Barging was presented as a way to keep logs out of salt water, and as such decrease the costs associated with salt contamination. From the interviews conducted, moving logs by barge is significantly more expensive than by boom, except in specific instances. However, the difference in transportation costs could potentially be more than offset by the reduction in maintenance costs related to mill corrosion. These costs should be better understood, as they can offset the difference in transportation costs.

How salt penetrates a log, and at what rate, is generally unknown. To protect logs from salt contamination, barges would need to deliver logs to mills that have salt water access only. However, for the many booms that line the shores of the Fraser River, does the flushing action of the fresh water dilute the salt that may be contained in the bark or wood of the log? This is an area that should be studied further so that solutions can be developed for different operations.

Debarking logs at a dryland sort that takes log deliveries exclusively by truck is one possible means to avoid salt-contaminated hog fuel. This method should also be investigated further.

Exploring opportunities where barges can transport logs in one direction and some other cargo for the return trip could reduce barging costs and should be explored further.

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FPInnovations®

Head Office

Pointe-Claire
570, Saint-Jean Blvd
Pointe-Claire, QC
Canada H9R 3J9
T 514 630-4100

Vancouver
2665 East Mall
Vancouver, BC.
Canada V6T 1Z4
T 604 224-3221

Québec
319, rue Franquet
Québec, QC
Canada G1P 4R4
T 418 659-2647

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