5.2.0 MUNICIPAL SOLID WASTE ANALYSIS

The Municipal Solid Waste Group has completed a preliminary inventory that assesses the biomass within the municipal solid waste (MSW) and construction and demolition (C&D) supply chain throughout the entire NARA region, which includes the WMC. Research focus is placed upon developing an overall inventory of the woody construction debris biomass in the Northwest (especially NARA communities), developing strategies to increase the recovery of this material, establishing QC/product specifications, and identifying where these materials fit within the wood utilization supply chain.

5.2.1 MSW/C&D WOODY BIOMASS INVENTORY IN NARA REGION

A preliminary MSW and wood waste assessment was performed to determine quantities of such materials for each state within the NARA region; results are presented in Table 5.2.1. Total United States waste information was acquired through an EPA report. Montana, Oregon, and Washington waste information was obtained through state databases or from state employees (references included in figures). So far, partial Idaho information has been acquired at the county level; not all counties have yet been contacted. Figure 5.2.1 illustrates MSW distribution by county and by landfill within the NARA region. MSW includes all household and commercial waste that is not hazardous in nature. Depending on the landfill or transfer station, recyclable items such as plastic, metal, glass, and wood are sorted and separated from non-recyclable MSW.

Wood waste can be disposed of in MSW landfills or reused/recycled at material recycling facilities (MRFs) and be used to create products such as reclaimed timber, composites, compost, or hogged fuel for energy recovery. A preliminary list of MRFs was originally created using state databases and Internet searches regarding wood recycling. In all, a list of 53 MRFs that recycle C&D wood waste was compiled for the 4-state NARA region. Quick-fact information regarding the MRFs is represented in Table 5.2.2. Wood waste quantities collected from MRFs were obtained in units such as board foot, C&D ton, cubic yard of loose scrap wood, and cubic yard of shredded wood; conversion factors can be viewed in Table 5.2.3. A list of MRFs and their pertinent data is represented in Table 5.2.4, and recycled wood waste distribution per county and MRF can be viewed in figure 5.2.2. In total thus far, a sum of 646,729 tons of recycled wood waste has been accounted for by MRFs within the NARA region.

Table 5.2.1. A preliminary MSW and wood waste assessment for each state within the NARA region

	Generated Municipal Solid Waste		Generated Wood Waste	
	Tons/year	lbs/Person/Day	Tons/Year	lbs/Person/Day
United States [1]	249,860,000	4.43	15,880,000	0.28
Idaho [2]	Not yet determined			
Montana [3]	1,323,343	7.26	Not yet determined	
Oregon [4]	4,740,561	6.71	376,798	0.53
Washington [5]	8,860,856	7.17	1,203,074	0.98

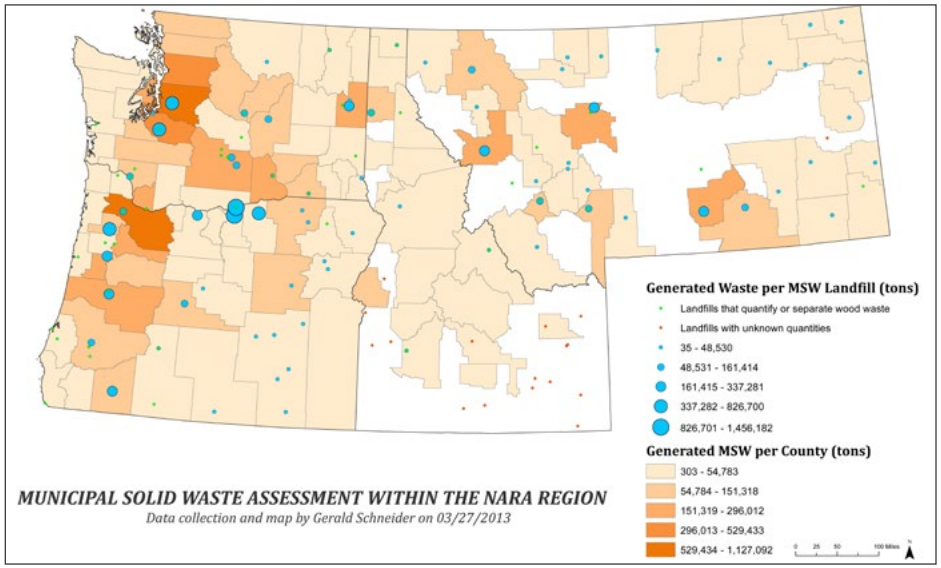

Figure 5.2.1. MSW distribution by county and landfill within the NARA region

Table 5.2.2. Quick facts regarding MRF research within the NARA region

MRF DATA PER STATE					
State	Total Known MRFs	Total MRFS with Data Unknown	Total MRFs with Volume Data Unknown	Estimated MRF Wood Quantities (tons/year)	Recycled Wood Majority Market
Idaho	4	0	0	44,979	Reclaim Timber
Montana	7	1	2	6,812	Reclaim Timber
Oregon	18	3	6	100,280	Hog Fuel
Washington	24	2	8	494,658	Hog Fuel
Total	53	6	16	646,729	Hog Fuel

Table 5.2.3. Table of conversion factors that were used during the wood waste assessment

WOOD VOLUME CONVERSION FACTORS		
Volume Type	Conversion	Source
Board Feet [BF]	BF * [0.008 Ton/1 BF]	Cunningham, Kyle. Converting Board Feet to Tons. University of Arkansas Division of Agriculture. http://www.arnatural.org/News/Timber_Report/Converting_Weight_Board_Feet.pdf Accessed 4/11/2013
Clean Wood within C/D Waste	C/D Tons * [0.115 Clean Wood/CD ton]	2007 Massachusetts Construction and Demolition Debris Industry Study, Final Report. DSM Environmental Services, Inc., 5/16/2008. www.mass.gov/dep/recycle/reduce/07cdstdy.pdf Accessed 01/04/2013
Cubic Yard [CY]: Shredded Wood Chips	CY * [500 lbs/1 CY] * [1 ton/2000 lbs	Standard Volume-to-Weight Conversion Factors. U.S. Environmental Protection Agency. http://www.epa.gov/smm/wastewise/pubs/conversions.pdf Accessed 8/22/2012
Cubic Yard [CY]: Wood Scrap, Loose	CY * [329.5 lbs/1 CY] * [1 ton/2000 lbs]	Standard Volume-to-Weight Conversion Factors. U.S. Environmental Protection Agency. http://www.epa.gov/smm/wastewise/pubs/conversions.pdf Accessed 8/22/2012

Table 5.2.4. List of MRFs within NARA region listed by state

IDAHO					
MRF	Location	Volume	Reach	Tipping Fees	Market
Building Material Thrift Store	Hailey, ID	25,000 tons Building Materials per year	No Data	No Data	Timber/Lumber Reuse
Cannon Hill Industries	Post Falls, ID Spokane, WA	ID: 32,000 green tons WA: 15,000 green tons	100 miles	No Data	Hog Fuel sent to Clearwater Paper Corporation
Ross Lumber	Shoshone, ID	600 tons/year	Supply: Through U.S. Distribution: Pacific Northwest	No Data	Timber/Lumber Reuse
Trestlewood	Blackfoot, ID	9504 tons/year	Supply: Western U.S. Distribution: Throughout U.S.	Bid Based	Reclaim Timber
MONTANA					
MRF	Location	Volume	Reach	Tipping Fees	Market
Big Timberworks	Gallatin Way, MT	35 tons/year of wood waste residue	Throughout U.S.	Bid Based	Reclaim Timber
Eko Compost	Missoula, MT	No Data	Supply: Bonner, ID No Distribution	$1/bag $7/pickup or small trailer $15/ large trailer $50/semi load No charge for pre-chipped	Compost Firewood
Heritage Timber	Bonner, MT	2800 tons stored	Supply: 250 miles Distribution: Pacific Northwest	No Data	Reclaim Timber
Home ReSource	Missoula, MT	1977 tons/year	Eastern Montana and Idaho	All is donated Tax Class 501C3	Mostly Reuse Small Pieces sent to Eko Compost
Johnson Brothers Recycle	Missoula, MT	No Data	No Data	No Data	No Data
Montana Reclaimed Lumber Company	Gallatin Gateway, MT	16,000 tons stored	No Data	Bid Based	Reclaim Timber
Resource Site Services	Bozeman, MT	2000 tons/year	100 miles service reach, no distribution	Bid based	Mobile Wood and Construction Material Grinding

5.2.2 INVENTORY OF NARA COMMUNITIES

To date, a review of our research has indicated that separated landfill wood waste data within the WMC is predominantly categorized into three categories: inert waste, C&D waste, and wood waste (a phrase that usually refers to clean wood). Ascertaining wood waste quantities within inert waste totals is difficult and no modeling technique has currently been determined. Wood waste derived from C&D waste on average can be quantified as 31% of total C&D waste, and 34% within C&D wood waste is untreated, unpainted, or comes from pallets. Table 5.2.5 indicates MSW, C&D, and wood waste totals from counties within the WMC. There are currently five known counties within the WMC that quantify clean wood waste, and there are four known counties that quantify C&D waste. In summary, 8,456 tons of usable C&D wood waste and 15,413 tons of clean wood waste were collected by participating counties within the WMC, creating a total of 24,639.5 tons of estimated wood waste a year. Figure 5.2.2 is an updated map representing known landfills that separate wood within the WMC. Further maps will indicate MSW, C&D, and wood waste quantities per county.

Table 5.2.5. Wood waste and C&D clean wood waste totals for counties withing the WMC.

State	County	Population (2011)	MSW (tons)	C&D (tons)	C&D Wood* (tons)	Wood (tons)
ID	Bonner[1]	40,808	33,330	0	0	2,500
	Boundary[2]	10,804	4,500	0	0	318
	Kootenai[3]	141,132	121,171	0	0	10,899
	Lemhi[4]	7,967	9,048	644	74.06	0
	Shoshone[5]	12,672	5,691	0	0	1,390
MT	Gallatin[6]	91,377	108,647.37**	6,807.3	782.84	306
	Silver Bow[7]	34,383	75,679**	13,060	1,501.90	0
WA	Spokane[8]	473,761	314,355.91	59,719.12	6,867.70	0
TOTAL					9,226.50	15,413
					24,639.50	
**Clean C&D Wood figured as 11.5% of C&D total.*						
***MSW quantities provided by State of Montana[9]*						

1 Bonner County Solid Waste Department. Received via telephone questionnaire: 8/22/12
2 Boundary County Solid Waste Department. Received via telephone questionnaire: 8/22/12
3 2011 Solid Waste Analysis. Kootenai County Solid Waste Department. Coeur D'Alene, ID. Provided by Kootenai County Solid Waste Department: 8/22/12
4 Lemhi County Solid Waste Management. Received via telephone questionnaire: 8/22/12
5 Shoshone County Solid Waste Department. Received via telephone questionnaire: 8/22/12
6 Gallatin Solid Waste Management District. Fiscal Year 2010—2011 Annual. Provided by Gallatin Solid Waste Management District: 8/02/12
7 Butte Silver Bow Rocker Landfill. Received via telephone questionnaire: 8/02/12
8 CountyTotals11.xcl. State of Washington Department of Ecology. http://www.ecy.wa.gov/programs/swfa/solidwastedata/ Accessed 1/07/13
9 MT—LF-tonnage-reg.xcl. State of Montana Department of Environmental Quality. Received 8/14/12

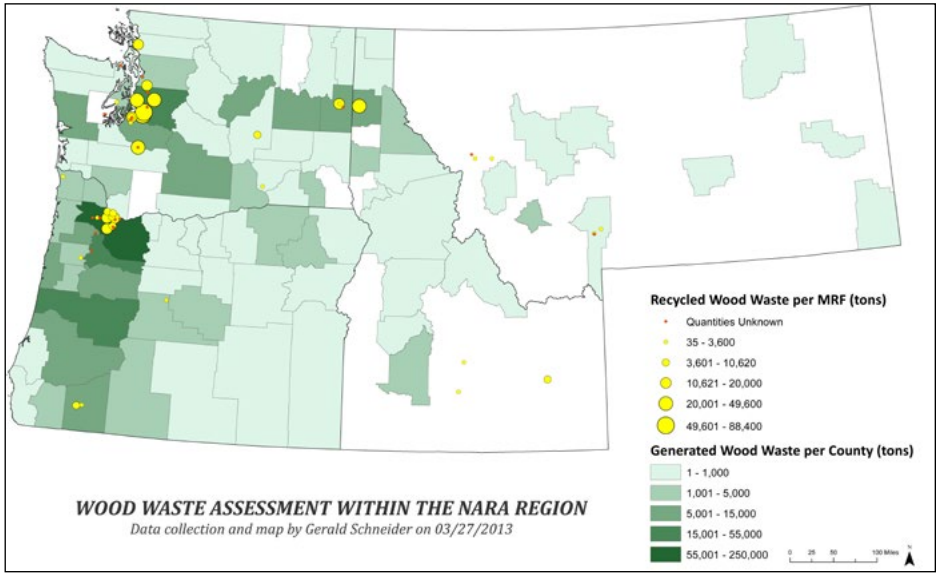

Figure 5.2.2. Wood waste distribution by county and MRF within the NARA region

Figure 5.2.3 is a map that represents MRFs within the WMC. Wood waste and C&D wood waste have been identified with two separate shades of green to show the known wood quantities from the estimated wood quantities (C&D). MRF research within the WMC is nearly complete; further information regarding two MRFs within the wmC is still anticipated. There are currently eleven known MRFs within the WMC, which include building salvage stores, reclaimed timber mills, wood grinding service companies, and general wood recyclers. Specific years for collected data may vary. Reclaimed timber mills collected a total of 2,824 tons of wood a year. Wood recyclers collected 6,477 tons of wood a year. Building salvage stores compiled 5,375 of C&D wood waste. In total, WMC MRFs compiled 15,413 tons of wood waste a year. This total, however, may include wood that is utilized in other markets.

Our research indicates that the majority of C&D wood waste accrues in areas of higher population densities, most notably Seattle, WA and Portland, OR. Figure 5.2.4 represents the distribution of wood waste per county and MRF within the western NARA region. Of the 53 MRFs in the 4-state NARA region, 41 MRFs are located east of the Cascade mountains. However, out of the 646,729 total tons of the MRF recycled wood waste quantified thus far, 546,832 tons (83%) derive from the western 4-state NARA region (i.e. west of the Cascades). Recycled wood waste in this region is primarily used for energy co-generation in the form of hogged fuel; other uses include composites, compost, and pulp.

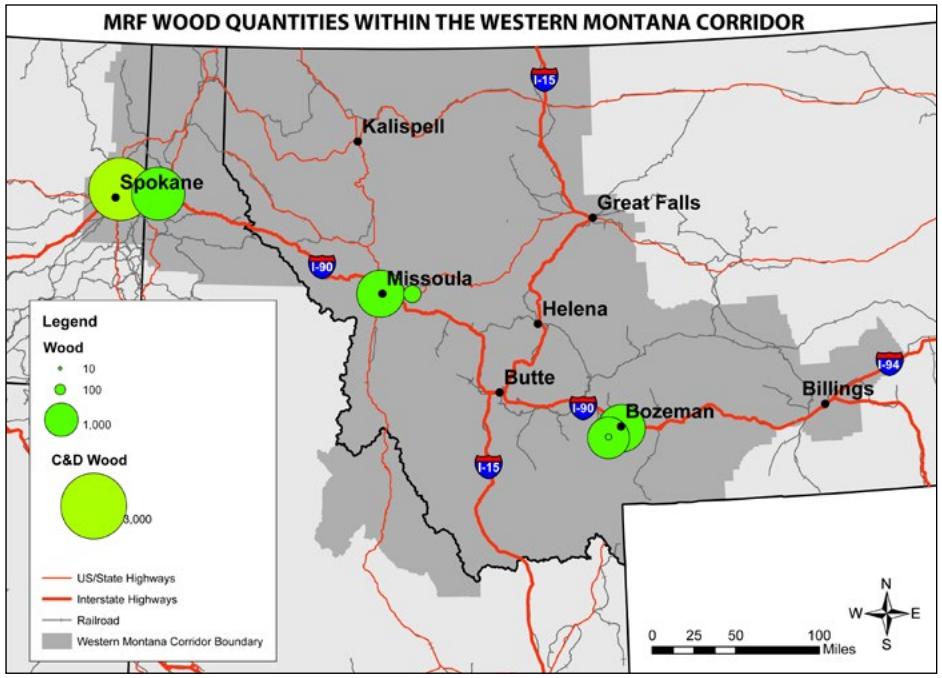

Figure 5.2.3. Wood waste distribution per MRF within Western Montana Corridor

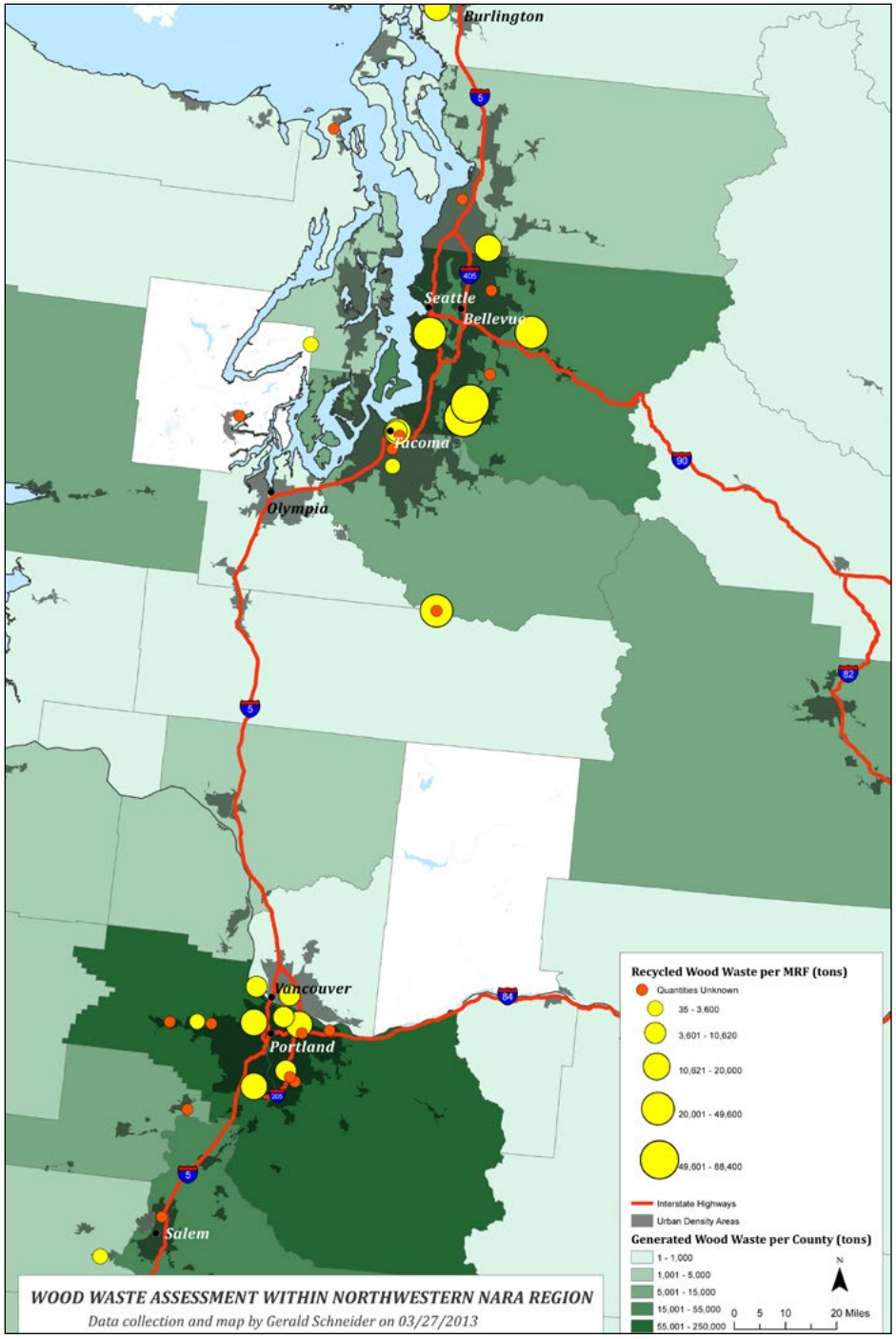

Figure 5.2.4. Wood waste distribution near urban density areas within western NARA region

5.2.3 NEXT STEPS: IDENTIFYING RECOVERY STRATEGIES

A supply Chain management (SCM) network was established and is essential for determining the viability of wood waste as a biofuel feedstock. SCM includes four aspects: sourcing, logistics, operations, and marketing. Sources of wood waste include MSW, industrial waste, construction and demolition (C&d) waste, and land clearing debris. Wood waste is often collected and separated at MRFs, landfills, and transfer stations; transportation methods include municipal self-haul, residential/commercial route trucks, and commercial drop-boxes. Although landfills are known for burying waste, there are many landfills that separate recyclable materials in order to prolong the lifespan of the landfill. Recyclable materials, such as wood waste, are often subcontracted or sold to MRFs for further recycling. MRFs recycle wood waste and produce products such as reclaimed timber, engineered wood, compost, paper pulp, soil amendment, and hogged fuel for energy recovery. Figure 5.2.5 represents a supply chain flow chart of the wood waste supply chain.

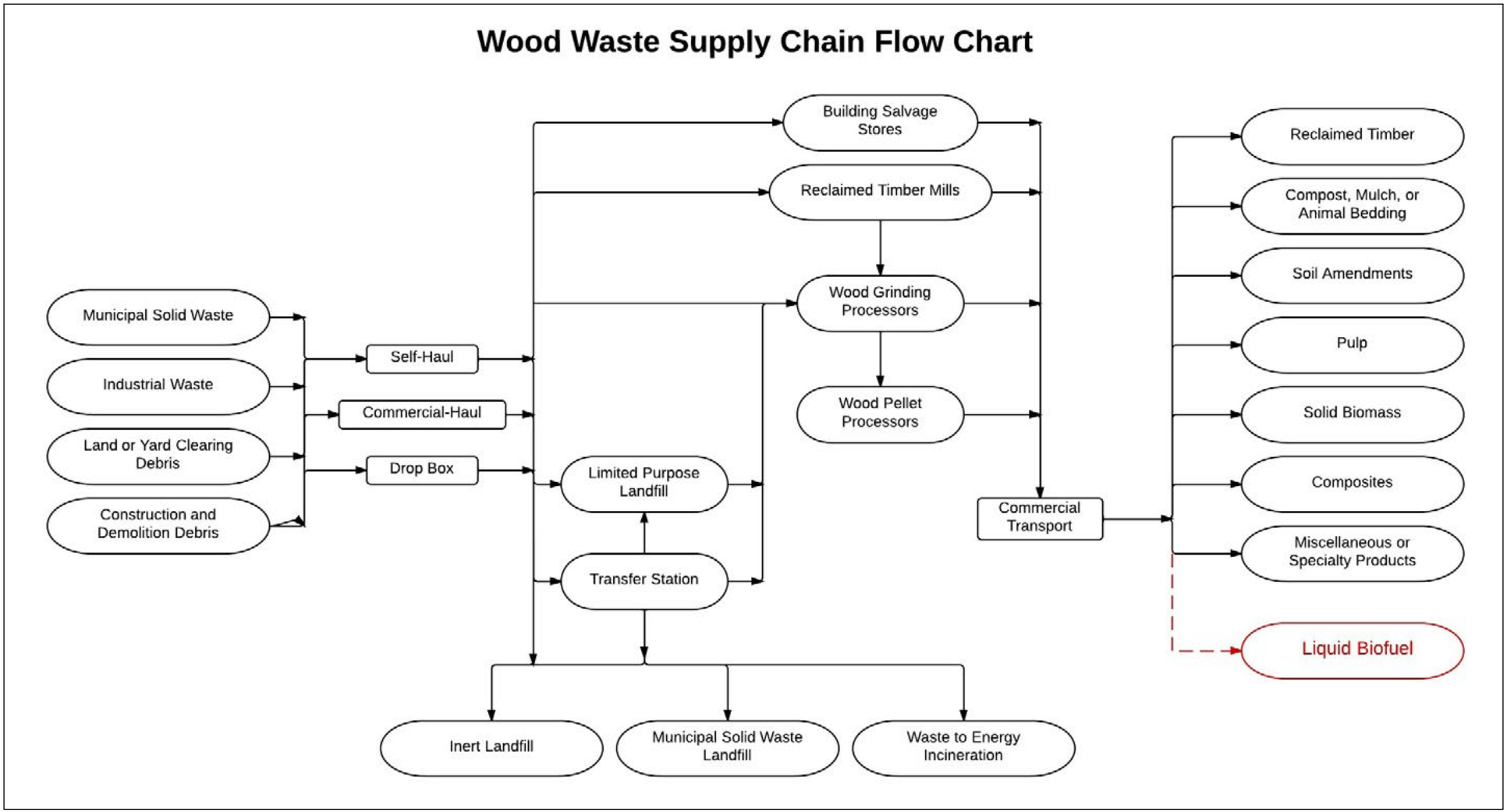

Figure 5.2.5. Illustrated flowchart of the wood waste supply chain

5.2.4 RECOMMENDATIONS/CONCLUSIONS

We are continuing to compile wood inventories within the C&D and MSW streams in the 4 NARA states (ID, MT, OR and WA) and several communities within the 4-state region. We are using ArcGIS to map the wood waste locations, and we are developing databases that can be incorporated into the final 4-state NARA regional assessment study. We are developing empirical models to predict the waste wood inventories in communities that do not have sufficient data.

5.2.5 REFERENCES

[1] Bonner County Solid Waste Department. Received via telephone questionnaire: 8/22/12

[2] Boundary County Solid Waste Department. Received via telephone questionnaire: 8/22/12

[3] 2011 Solid Waste Analysis. Kootenai County Solid Waste Department. Coeur D'Alene, ID. Provided by Kootenai County Solid Waste Department: 8/22/12

[4] Lemhi County Solid Waste Management. Received via telephone questionnaire: 8/22/12

[5] Shoshone County Solid Waste Department. Received via telephone questionnaire: 8/22/12

[6] Gallatin Solid Waste Management District. Fiscal Year 2010—2011 Annual. Provided by Gallatin Solid Waste Management District: 8/02/12

[7] Butte Silver Bow Rocker Landfill. Received via telephone questionnaire: 8/02/12

[8] CountyTotals11.xcl. State of Washington Department of Ecology. http://www.ecy.wa.gov/programs/swfa/solidwastedata/ Accessed 1/07/13

[9] MT—LF -tonnage-reg.xcl. State of Montana Department of Environmental Quality. Received 8/14/12