Movement of Plastic-baled Garbage and Regulated (Domestic) Garbage from Hawaii to Landfills in Oregon, Idaho, and Washington.

Final Biological Assessment, February 2008

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I. Introduction and Background on Proposed Action

This biological assessment (BA) has been prepared by the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) to evaluate the potential effects on federally-listed threatened and endangered species and designated critical habitat from the movement of baled garbage and regulated (domestic) garbage (GRG) from the State of Hawaii for disposal at landfills in Oregon, Idaho, and Washington. Specifically, garbage is defined as urban (commercial and residential) solid waste from municipalities in Hawaii, excluding incinerator ash and collections of agricultural waste and yard waste. Regulated (domestic) garbage refers to articles generated in Hawaii that are restricted from movement to the continental United States under various quarantine regulations established to prevent the spread of plant pests (including insects, disease, and weeds) into areas where the pests are not prevalent. Together, these comprise garbage and regulated (domestic) garbage, referred to as GRG in this BA. The movement of GRG would be approved by APHIS after compliance agreements between APHIS, the State of Washington, Idaho, or Oregon, the State of Hawaii, and specific applicants are agreed upon and signed in accordance with APHIS regulations (7 Code of Federal Regulations (CFR) § 330.400). The regulations allow GRG from Hawaii to be moved to the continental United States if it is compressed, packaged, shipped, and disposed of in a manner that the APHIS Administrator determines is adequate to prevent the introduction or dissemination of plant pests, and if it is moved in compliance with all applicable laws for environmental protection.

Proposed Action: Baled GRG will be transported on barges pulled by tugboat from Hawaii to the mainland where the barges will enter the Columbia River and continue up the river to specified ports on the river. The baled waste will be transloaded from the barge to an asphalt or concrete staging area then will be loaded onto trucks or rail cars and transported to specified, approved landfills in Washington, Oregon, and Idaho (see figure 1 for potential landfills). APHIS may authorize this activity under compliance agreement with applicants that have requested APHIS approval.

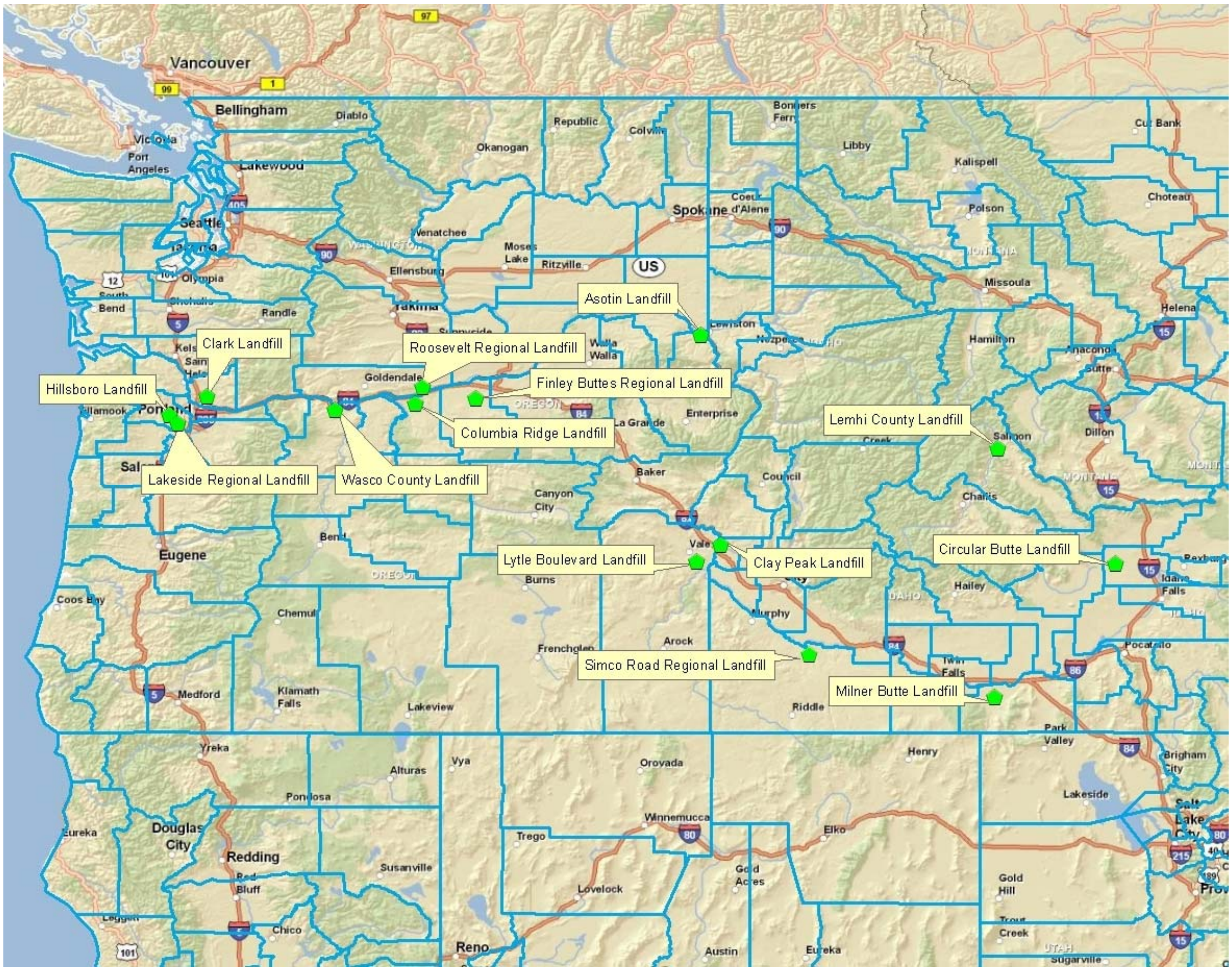

Figure 1. Potential landfills in Oregon, Washington, and Idaho to receive baled GRG from Hawaii.

Duration of the proposed action: APHIS expects that the proposed actions will continue for the foreseeable future, as long as the destination landfills maintain required permits to continue functioning and there is capacity in the landfills to accept waste. For example, the Regional Disposal Company (owner and operator of the Roosevelt Regional Landfill in Washington) has an agreement with Klickitat County, Washington to operate the landfill until 2041. The Columbia Ridge Landfill in Gilliam County, Oregon, has an estimated remaining service life (permitted site capacity) of approximately 50 years.

At this time, no applicant has specified a timeframe for the proposed action; however, compliance agreements between APHIS, PPQ and the waste management companies are renewed every 3 years. If there are changes to be made to the agreement, those are included at that time if they are agreed upon by both the companies and PPQ (and PPQ would also need to make sure any changes meet PPQ regulations, etc.,). If the effects of the proposed action change in a manner or to an extent not previously considered APHIS will re-initiate consultation at that time.

Previous Actions and History of Consultation: Currently, there are two companies that have been approved to move GRG from Honolulu, Hawaii to Roosevelt Regional Landfill in Klickitat County, Washington – Hawaii Waste Systems (HWS) and Pacific Rim Environmental Resources, Inc. (PRER). Each applicant has signed two compliance agreements, one for the handling of GRG at its point of origin and one for handling it at its destination (see appendix A for examples of compliance agreements). These compliance agreements detail conditions and provisions for the movement and transport of bales and the actions to be taken in the event of a breach in the bale wrapping or a spill. While the compliance agreements for HWS and PRER are not identical, they are substantially similar in all aspects affecting pest risk. That is, the compliance agreements are constructed to reduce pest risk to the lowest level possible. Key items that will be included in the compliance agreements are reduction of agricultural waste and yard waste, compression and baling standards to ensure compact and air-tight baling, handling procedures, spill response procedures, and final landfill disposal standards. Although compliance agreements are in place, no baled GRG has yet been barged to the Roosevelt Regional Landfill by either company to date.

APHIS previously consulted with the U.S. Fish and Wildlife Service (FWS) once and the National Marine Fisheries Service (NMFS) twice on specific parts of this action. APHIS prepared a BA regarding the proposed rule (now final regulation 7 Code of Federal regulations Section 330.402 and 403) that governs the interstate movement of baled GRG from Hawaii to the continental United States. On September 11, 2006, APHIS received a concurrence letter from NMFS indicating that the administrative amendments of the proposed rule were not likely to adversely affect several whale and sea turtle species. The concurrence was based on the understanding that all site-specific compliance agreements associated with the actual movements of baled GRG from Hawaii would undergo individual section 7 consultations at the time they were proposed. APHIS then submitted a BA to both FWS and NMFS that analyzed a specific proposal to approve the barging and trucking of baled waste from Oahu to the Roosevelt Regional Landfill in Klickitat County, Washington, by two waste management companies, HWS and PRER. APHIS received concurrence from both agencies (letters dated December 15, 2006 (FWS) (USFWS Reference: 13260-2007-I-0023) and December 18, 2006 (NMFS)) on that proposed action and compliance agreements were finalized for both companies. Now, additional companies are proposing to transport GRG via barge from Hawaii to landfills in Washington and other states, including Oregon and Idaho and more companies may request approval from APHIS for such activity. Also, HWS and PRER have submitted amendments to their initial requests. APHIS believes that the reinitiation of section 7 consultation with each slight adjustment of each proposal would be burdensome to both APHIS, FWS, and NMFS and may appear as "piecemealing" the consultation. APHIS believes that all current and future proposals for movement of baled GRG can be considered and addressed in one consultation if a "worst case scenerio" approach is used in considering effects of the action on federally listed species and critical habitat. Therefore, this BA will consider the movement of a maximum amount of baled GRG by any company from the State of Hawaii to any qualified landfill in Washington, Oregon, or Idaho under compliance agreement from APHIS. The standards required for the original applicants (HWS and PRER) in regards to baling, handling, spill response, and disposal would apply to any company that requests to barge GRG from Hawaii to Washington, Oregon, or Idaho. APHIS will keep track of each proposal/approval to ensure that the amounts of GRG, or barge, rail, or truck traffic considered in this BA are not exceeded. APHIS will re-initiate consultation with FWS and NMFS if a proposal would cause exceedance of the amounts of GRG exported from Hawaii, number of barge trips, or amount of rail or truck traffic that were considered in this document. APHIS will also re-initiate consultation if new effects not considered in this BA are discoverered or if new species are listed or critical habitat is designated that could be affected by this action.

Action Area: The action area for this project encompasses the ocean route from Hawaii to the mainland, the barge-navigable portion of the Columbia River, and rail and truck routes in Oregon, Washington, and Idaho.

Hawaii

Description: The State of Hawaii is one of the smaller states with only 10,941 square miles of territory spread over six larger tropical islands and a number of smaller ones. It is also physically separated from the mainland of the United States by 2,300 miles of Pacific Ocean. Its tropical nature and isolated location have provided Hawaii with many unique attributes, as well as some unique challenges. The nearshore environments around the islands of the Hawaiian archipelago include a large array of marine animals, corals and plants, some of which are endemic and found nowhere else. This area includes the Hawaiian Islands Humpback Whale National Marine Sanctuary, which is comprised of five separate areas abutting six of the major islands of the State of Hawaii (figure 2). A primary attraction of this marine sanctuary is the large congregation of humpback whales that winter in the area. Beyond the nearshore environments surrounding Hawaii is open ocean inhabited by resident and migratory pelagic fish, birds, sea turtles, and marine mammals. See appendix B for a list of marine mammals of Hawaii, Washington, and Oregon protected under the Marine Mammal Protection Act.

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U.S. Army Corps of Engineers. 2006a. Waterborne Commerce of the United States, Calendar Year 2005: Part 4–Waterways and Harbors; Pacific Coast, Alaska and Hawaii. Institute for Water Resources, U.S. Army Corps of Engineers, Washington, D.C. 207 pp.

U.S. Army Corps of Engineers. 2006b. Waterborne Commerce of the United States, Calendar Year 2005: Part 5–National Summaries. Institute for Water Resources, U.S. Army Corps of Engineers, Washington, D.C. 99 pp.

MSW that is disposed of at the Waimanalo Gulch municipal landfill has primarily been collected by private waste haulers and commercial self-haulers. For the most part, it includes waste generated at businesses, institutions, multi-family residences, and condominiums. Waste collected from single-family households and some apartments and commercial facilities is collected by County Refuse Division trucks and is sent to the incinerator along with some of the MSW from private waste haulers. The waste stream that is deposited at Waimanalo Gulch consists of the following types of materials (R.M. Towhill Corp., 1999):

Paper……………………………………………………….8.9%
- Including:
- Cardboard…………5.2%
- Low grade paper….2.2%

Plastics……………………………………………………..…5.0%
- Including:
- Film plastics…..2.5%
- Rigid plastic….1.4%

Metal……………………………………………………….12.3%

Glass……………………………………………………...0.5%

Other inorganics …………………………………………...20.0%
- Including:
- Gypsum wallboard….7.0%
- Asphalt roofing……..1.4%
- Asphalt paving………1.9%
- Concrete…………….2.9%
- Sand/soil/dirt……….4.0%

Other wastes………………………………………………..6.4%
- Including:
- Furniture/mattresses…..5.1%
- Appliances……………..1.0%

Yard Waste…………………………………………………..6.0%

Wood ……………………………………….……………31.2%
- Including:
- Treated wood…….13.9%
- Pallets/crates..……..7.6%
- Untreated lumber….5.8%
- Untreated plywood…2.6%
- Stumps……………..1.3%

Other organics……………………………………………………9.6%
- Including:
- Carpet…………….4.5%
- Food……………..1.6%

There are other sources of GRG in Hawaii besides that destined for Waimanalo Gulch municipal landfill. However, any alternative sources of GRG (i.e., Hilo or other cities or islands of Hawaii) must meet the APHIS requirement of APHIS regulations pertaining to the regulation of garbage generated in Hawaii (7 CFR part 330.402 and 403). Specifically, garbage is defined as urban (commercial and residential) solid waste from municipalities in Hawaii, excluding incinerator ash and collections of agricultural waste and yard waste. Regulated (domestic) garbage refers to articles generated in Hawaii that are restricted from movement to the continental United States under various quarantine regulations established to prevent the spread of plant pests (including insects, disease, and weeds) into areas where the pests are not prevalent. Together, these comprise garbage and regulated (domestic) garbage, referred to as GRG in this BA.

Description of APHIS Risk Assessments, Regulations, and Other Aspects of the Proposed Action

Potential for Escape of Plant Pests: The opportunity for GRG to carry plant pests has been a major concern for APHIS and is the primary reason that APHIS has regulatory interest in Hawaiian GRG that may be transported to the continental United States. The opportunity for such pests to be introduced into an environment where they are not normally found and where they could potentially do environmental harm is of concern. The compression, baling, and wrapping process that is required for all GRG to be shipped to the continental United States is designed to reduce the potential for impact to an insignificant risk. By prohibiting agricultural and yard waste (other than incidental amounts (<3%) that may be present in GRG despite reasonable efforts to maintain source separation), much of the risk of pest presence in the GRG is eliminated, resulting in an insignificant risk of pest introduction and establishment in the continental United States. A review of the composition of the GRG from Oahu that could potentially be shipped to the mainland United States indicates that the greatest potential for pest presence would be in any yard waste, stumps, sand/soil/dirt, and food that could be in the GRG.

The USDA, Center for Plant Health Science and Technology (CPHST) developed several risk assessments (attached as appendices C-F in this document) that evaluate the effectiveness of the compressing and packing technology for processing GRG to keep plant pests from entering and successfully establishing in the States of Washington, Oregon, and Idaho, and in the continental United States.[2] This is because injurious plant pests (quarantine pests) exist in Hawaii that are not currently present or widely distributed within and throughout the continental United States. Under the circumstances, it was necessary to determine the risk and likelihood of introduction and establishment of these pests in the continental United States, and whether there would be potential economic and environmental impacts. APHIS analyzed the plant pest risk of introduction and subsequent establishment of plant pests from properly compressed, baled, and wrapped Hawaiian GRG and found that risk to be insignificant (see appendices C-F).

This risk is considered insignificant for the following reasons: Any pests that remain in the GRG (e.g., in the incidental amounts (<3%) of yard and agricultural waste and soil with weed seeds and food) would be subjected to the compression, baling, and wrapping processes. Compression, baling, and wrapping of GRG results in crushing and oxygen deprivation of pests. When bales

[2] Risks to animal health have not been considered in the context of the risk assessment process because there are currently no known exotic animal diseases in Hawaii that would pose a threat of entry into the continental United States, including the State of Washington.

are wrapped to the point of being airtight, as required, internal temperatures begin to rise and conditions inside the bale become anoxic within several days, thus depriving pests of oxygen. Wrapped bales sit in a staging area for 5 days prior to loading them onto a barge for transport to the continental United States. This allows time for anoxic conditions to develop within the bales. When coupled with the time required to barge the bales to the destination landfill, it is clear that any pests that have survived the packaging process will have been exposed to anoxic conditions for between two and three weeks. Once arriving at the landfill destination, the bales will be transloaded to an asphalt or concrete staging area. Bales may remain at the staging area for a few weeks before being transloaded to trucks or rail cars and sent to the landfill. Once placed in the landfill, they will be covered with six inches of dirt on that same day and will be buried by 7 feet of material within a short time of their arrival.

As long as bales are not punctured, any pests that do survive the trip to to the landfill (most likely weed seeds and pathogens on rotting food) cannot escape the bale and are buried at the landfill, thus posing no risk to the environment. If bales are punctured or torn open during handling, they will either be re-wrapped or patched, depending upon the severity of the puncture, according to the detailed requirements outlined in the compliance agreements to restore their airtight condition. Because of the insignificant risk of plant pest escape and establishment in the continental United States, there will be no effect on listed species or critical habitat from the introduction of non-indigenous plant pests.

Potential for Escape of "Hitchhiking" Pests: The Pest Risk Assessments, prepared by APHIS, indicate that overall, the transportation of urban solid waste from Hawaii in plastic-wrapped, airtight bales poses a low risk of pest establishment; and that the greatest risk is from hitchhikers. Thus, the PRA specific for the movement to Oregon recommends that the bales be certified mollusk-free by the company. The PRA specific for the movement to Idaho also recommends inspection and certification. Included in all Compliance Agreements will be a requirement that the company provide inspection at each transloading location as well as the final offloading point. The companies are required by the compliance agreement to ship bales that do not carry hitchhikers. There is no specific method required by APHIS to achieve this standardbesides inspection, although other methods may be used as well. If a mollusk is found on a pallet a or bale at any of these inspection points on the mainland, the company is required under the Compliance Agreement, to separate it on a solid, flat, impervious surface made of asphalt or concrete, circle the bale with salt, and contact local PPQ immediately so that proper action can be taken to mitigate any potential pest risk. The Compliance Agreements also require that the staging area for bales in Hawaii as well as on the mainland be a solid, flat, impervious surface made of asphalt or concrete.

Before handling and transport of Hawaiian GRG bales, company employees are required to be trained in various procedures for complying with the agreement, including training on Hawaiian plant pests. If a company is found to be in violation of any part of the Compliance Agreement, then the Compliance Agreement may be cancelled in accordance with 7 Code of Federal Regulations 330.403(d).

Hawaii side generic compliance agreement:
COMPANY will ensure that the Staging Area be kept clean and free of loose garbage and soil. The Staging Area shall be clearly marked and physically separated from the Transport Area. Operational procedures pertinent to the Staging and Transport areas shall be posted in a location visible to all COMPANY personnel and authorized representatives.

COMPANY shall develop and enforce plans for pest exclusion and eradication programs to control pests that may be attracted to the bales in the staging and loading area (i.e. rodents, birds, mollusks, etc.) These plans shall be submitted for approval by USDA, APHIS, PPQ in Honolulu, Hawaii.

COMPANY personnel or their authorized representative shall conduct an inspection of each bale upon placement onto the barge. Bales shall be inspected for any punctures, ruptures, or tears and external contaminants (i.e. soil, garbage, mollusks) upon placement onto the barge. The date and identification of the personnel responsible for the inspection and authorization for forward movement shall be indicated in the bale manifest.

Mainland side generic compliance agreement:

The staging and transport area shall be kept clean and free of loose garbage and soil. The areas will be controlled for birds, rodents, mollusks, and any other pests that may be attracted to the bales.

All Garbage and Regulated (domestic) Garbage must be protected from birds, rodents, and mollusks during staging and transport. The bales of Garbage and Regulated (domestic) Garbage will be isolated from close proximity to exposed fresh fruits, plants, or other activities which may attract hitchhiking plant pest. Barriers will be erected if this occurs due to unusual and unavoidable circumstances if the operations cannot be moved.

If bales are palletized, each pallet will be inspected thoroughly to ensure no hitchhiking mollusks. Pallets found to contain hitchhiking mollusks will be separated immediately. The infested pallets will be safeguarded within a circle of salt on a level, solid, and impervious surface of asphalt or cement, and local PPQ will be notified promptly.

PPQ does conduct compliance checks, and with most new operations, those checks are more heavy and frequent at the beginning of the program. This provides opportunity to address any concerns and ensure that the company is meeting the standards set in the Compliance Agreement. If the company is operating according to the Compliance Agreement, then PPQ compliance checks become less frequent. The frequency of those checks will be determined byPPQ locally.

See appendices C-F for APHIS risk assessments regarding transport of GRG from Hawaii to the continental United States, and specifically, Washington, Oregon, and Idaho.

APHIS Regulations Pertaining to the Regulation of Garbage Generated in Hawaii:

Sec. 330.402 Garbage generated in Hawaii

(a) Applicability. This section applies to garbage generated in households, commercial establishments, institutions, and businesses prior to interstate movement from Hawaii, and includes used paper, discarded cans and bottles, and food scraps. Such garbage includes, and is commonly known as, municipal solid waste.

(1) Industrial process wastes, mining wastes, sewage sludge, incinerator ash, or other wastes from Hawaii that the Administrator determines do not pose risks of introducing animal or plant pests or diseases into the continental United States are not regulated under this section.

(2) The interstate movement from Hawaii to the continental United States of agricultural wastes and yard waste (other than incidental amounts (less than 3 percent) that may be present in municipal solid waste despite reasonable efforts to maintain source separation) is prohibited.

(3) Garbage generated onboard any means of conveyance during interstate movement from Hawaii is regulated under Sec. 330.401.

(b) Restrictions on interstate movement of garbage. The interstate movement of garbage generated in Hawaii to the continental United States is regulated as provided in this section.

(1) The garbage must be processed, packaged, safeguarded, and disposed of using a methodology that the Administrator has determined is adequate to prevent the introduction or dissemination of plant pests into noninfested areas of the United States.

(2) The garbage must be moved under a compliance agreement in accordance with Sec. 330.403. APHIS will only enter into a compliance agreement when the Administrator is satisfied that the Agency has first satisfied all its obligations under the National Environmental Policy Act and all applicable Federal and State statutes to fully assess the impacts associated with the movement of garbage under the compliance agreement.

(3) All such garbage moved interstate from Hawaii to any of the continental United States must be moved in compliance with all applicable laws for environmental protection.

Sec. 330.403 Compliance agreement and cancellation.

(a) Any person engaged in the business of handling or disposing of garbage in accordance with this subpart must first enter into a compliance agreement with the Animal and Plant Health Inspection Service (APHIS). Compliance agreement forms (PPQ Form 519) are available without charge from local USDA/APHIS/Plant Protection and Quarantine offices, which are listed in telephone directories.

(b) A person who enters into a compliance agreement, and employees or agents of that person, must comply with the following conditions and any supplemental conditions which are listed in the compliance agreement, as deemed by the Administrator to be necessary to prevent the dissemination into or within the United States of plant pests and livestock or poultry diseases:

(1) Comply with all applicable provisions of this subpart;

(2) Allow inspectors access to all records maintained by the person regarding handling or disposal of garbage, and to all areas where handling or disposal of garbage occurs;

(3)(i) If the garbage is regulated under Sec. 330.401, remove garbage from a means of conveyance only in tight, covered, leak-proof receptacles;

(ii) If the garbage is regulated under Sec. 330.402, transport garbage interstate in packaging approved by the Administrator;

(4) Move the garbage only to a facility approved by the Administrator; and

(5) At the approved facility, dispose of the garbage in a manner approved by the Administrator and described in the compliance agreement.

(c) Approval for a compliance agreement may be denied at any time if the Administrator determines that the applicant has not met or is unable to meet the requirements set forth in this subpart. Prior to denying any application for a compliance agreement, APHIS will provide notice to the applicant thereof, and will provide the applicant with an opportunity to demonstrate or achieve compliance with requirements.

(d) Any compliance agreement may be canceled, either orally or in writing, by an inspector whenever the inspector finds that the person who has entered into the compliance agreement has failed to comply with this subpart. If the cancellation is oral, the cancellation and the reasons for the cancellation will be confirmed in writing as promptly as circumstances allow. Any person whose compliance agreement has been canceled may appeal the decision, in writing, within 10 days after receiving written notification of the cancellation. The appeal must state all of the facts and reasons upon which the person relies to show that the compliance agreement was wrongfully canceled. As promptly as circumstances allow, the Administrator will grant or deny the appeal, in writing, stating the reasons for the decision. A hearing will be held to resolve any conflict as to any material fact. Rules of practice concerning a hearing will be adopted by the Administrator. This administrative remedy must be exhausted before a person can file suit in court challenging the cancellation of a compliance agreement.

(e) Where a compliance agreement is denied or canceled, the person who entered into or applied for the compliance agreement may be prohibited, at the discretion of the Administrator, from handling or disposing of regulated garbage.

GRG Baling Process: In Hawaii (all islands), trucks collect waste and take it to a sorting facility. GRG for baling and transportation to the mainland United States is prohibited from containing more than incidental amounts (less than 3%) of agricultural and yard wastes. From the sorting area it is moved to a compression baler where it is unloaded and fed into the baler for compression, baling, and wrapping. GRG is compressed to 1,000 kilograms per cubic meter. All bales of GRG are wrapped with a minimum of four layers of low density impermeable plastic film to provide an airtight and leak-proof enclosure. Wrapped bales weigh between 1.7 to 4 tons. From the compression baler bales are then sent to a staging area until they are loaded onto a barge for the trip to the mainland.

Barge and tug description: The applicants use barges that range in length from 400 to 450 feet long and between 80 and 100 feet wide. Barges are powered by tugs that are 3,000 to 4,000 horsepower and range in length from 90 to 130 feet. The average towing speed across the ocean is 6 to 9 knots and the maximum tow speed is 11.6 knots. Barges will transport approximately 5000-9000 tons of GRG per barge. Bales will be secured to barges by straps or other methods to prevent loss of bales during ocean crossing and river transport.

Barges carry no fuel or oil. Tugs carry between 100,000 and 200,000 gallons of fuel and 500 gallons of oil. No fuel or oil will be discharged during the voyage; an appropriate quantity of fuel will be loaded in Hawaii such that the remaining fuel is sufficient for the trip up the

Columbia River but not so excessive that a discharge is required to make draft for passage though the locks.

Ocean routes of travel: The applicants have indicated that the tug/barge route that will be traveled (in a westbound context) is such that the barge will travel up the Columbia River and out into the Pacific Ocean approximately 25 miles, where it will turn south. They will travel south parallel to the coast until near Eureka, California. There, they will make the turn west for Hawaii in a fairly straight southwesterly line. There could be some variation in the route taken however. The full route from Hawaii to the Columbia River is roughly 2,500 miles. See figure 3 for a general map of the barge/tug route.

Figure 3. General route map for barging GRG from Hawaii across the Pacific Ocean to the mouth of the Columbia River.

Ballast Water: The tugs have internal ballast tanks to provide trim and stability for the ocean crossing. The tugs draw water from the ocean as required to meet trim and stability requirements. Tug ballast water is drawn from the sea and discharged at sea.

Barges are ballasted only during the loading and unloading phase alongside the dock. As barge cargo is unloaded, the stability of the barge shifts, requiring the barge to ballast for trim and stability. Similarly, as the barge is loaded, the center of gravity shifts requiring the barge to ballast to accommodate the weight change. All water taken on to ballast barges for loading or unloading is released into the same water body that it was taken from. No ballast water is carried in the barge ballast tanks for the voyage across the ocean. Thus, there will be no effect on any listed species or critical habitat as a result of ballast water discharge.

Hull Fouling: Both barges and tugs use the industry standard ablative coating system to prevent hull fouling. The ablative coating provides a slick surface to which fouling organisms cannot adhere. Currently, barges and tugs are using Interclene™, formula BRA 572, from International Paint. However, the specific anti-fouling coating used could vary in the future. Underwater moving equipment is further protected with sacrificial zinc anodes. However, APHIS has no authority to regulate hull fouling prevention.

Based on information received from Dan Brown, U.S. Fish and Wildlife Service, Pacific Region, Ecological Services, many of these treatments may result in copper leaching. Dissolved copper is known to cause olfactory impairments in salmonids. Copper can disrupt and damage the olfactory system of salmonids and cause a decreased capacity to detect important chemical cues in the environment, including but not limited to the location of prey, predator avoidance and locating natal streams. This sense of smell is critical for salmonids to complete to their complex life history behaviors including homing, foraging, and predator avoidance. Thus, there is potential for these sublethal impacts on the olfactory function to reduce individual salmon chances of survival and reproduction. To address the potential for effects of copper leachate from aquatic vessels , APHIS has prepared a risk assessment on the potential risk of copper exposure to salmonids in the Columbia River from barges containing baled GRG from Hawaii. This assessment is included in the "Fish Species That Occur in the Columbia River That Could be Affected by Transport of GRG by Barge" section.

Estimate of Barge Trips Across Ocean: A total of 980,000 tons of GRG annually has been requested by applicants for transport to landfills in Washington, Idaho, and Oregon by the companies that have requested APHIS permission for this action and additional companies could request APHIS permission to transport more to the mainland United States. In the 2005 calendar year, 1,425,752 tons of municipal solid waste were disposed of in the State of Hawaii, either by landfilling or incineration (OSWM, 2006). However, the State of Hawaii has indicated that it will only allow 300,000 tons of GRG to be exported off-island, regardless of what applicants have proposed. Thus, if a barge carries 5,000 tons of GRG, this would result in approximately 60 barge trips per year, slighly more than 1 per week. In this BA, APHIS will assume that there will be 100 barge trips of GRG from Hawaii per year across the Pacific Ocean to the mainland United States as a worst case scenerio, equaling 500,000 tons of GRG. However, an important aspect of the proposed action is that these tugs and barges traveled to Hawaii loaded with construction or other materials and would be returning to the mainland United States empty regardless of whether this proposed action is approved by APHIS. It is not cost-effective to send empty barges to Hawaii simply for the purpose of picking up baled GRG to return to the mainland. Thus, no net increase in barge traffic across the Pacific Ocean is expected from this action. Nonetheless, the potential effects of barge travel to listed and other marine species are discussed below, in section III, and in appendix B.

Potential Effects from Ocean Tug/Barge Travel: The potential direct and indirect effects from the ocean travel include striking marine animals by barge/tug combination, increased marine debris, and disturbance of species.

Columbia River Travel: The Columbia and Snake Rivers carry 50 million tons of cargo per year to and from the Pacific Ocean along a 465-mile waterway. A series of eight locks facilitates the passage of ships from the ocean to as far inland as Lewiston, Idaho. These locks are part of the same projects and reservoirs that produce hydropower and help control flooding. From the ocean to Portland, Oregon and Vancouver, Washington, dredging assures that a 40-foot-deep open river channel remains open year-long for ocean-going vessels. This 106-mile segment then connects with a 359-mile segment that extends to Lewiston, Idaho. Within this second segment, a 14-foot-deep channel for barges and other craft is kept open. To maintain this channel depth, maximum and minimum reservoir elevations are set. These elevations are determined within the context of meeting needs for electrical generation, flood control, and the release of water to help fish passage. In addition to its importance for shipping, the Columbia River is known for its fishery resources. Historically, it contained huge salmonid stocks that supported the indigenous peoples of the area. Over the years, treaties have recognized and maintained the importance of Indian fishing and hunting rights. While greatly reduced from historic levels, salmon and other fish stocks remain an important resource in the Columbia River.

Potential Effects from Columbia River Tug/Barge Travel: A direct effect of the proposed action could be an increase in barge traffic on the Columbia River. A U.S. Army Corps of Engineers (2004) study indicated that the net volume of tonnage for the Columbia Basin was 54,390,000 (short) tons of freight (all commodities), with over 1,113,000 tons going between Vancouver and The Dalles and 2,231,000 tons moving above The Dalles. Assuming an average of 5,000 tons per barge load, there are approximately 10,000 barge trips per year on the Columbia. If 100 additional barge trips per year are added, the anticipated increase in barge traffic (approximately 100 trips per year) would represent approximately 1 percent of all barge traffic on the Columbia. This represents a minimal increase in barge traffic on the Columbia River.

Household chemical waste comprises only 0.3% of Hawaiian solid municipal waste (R.M. Towhill Corp., 1999). Before baling, this waste will be sorted to eliminate yard waste, recyclables, and hazardous chemical waste. Although there is a possibility that some household chemical waste could make its way into a bale, an accident would have to occur for a bale to fall into the water. The bale would also have to break open. The rate of barge accidents is low, as will be discussed later in this BA. Because the potential quantity of household chemical wastes being present in the bales is very low, combined with the low probability of a bale-rupturing barge accident, it is very unlikely that there would be an effect on water quality in the mainstem Columbia River. Therefore, the potential impacts on water quality are not considered further.

Another direct effect of the proposed action could be a decrease in water quality from fuel or oil leaks from the tug. A catastrophic spill of fuel or oil is extremely unlikely and would be considered under an emergency consultation with the Services. However, routine leakage of small amounts of fuel or oil in the Columbia River is considered in this assessment. Effects of the fuel could directly poison fish species in the Columbia River or indirectly affect them by poisoning invertebrate or prey species. Oil and petroleum products vary considerably in their toxicity, and the sensitivity of fish to petroleum varies among species. The sublethal effects of oil on fish include changes in heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine system, and a variety of biochemical, blood, and cellular changes, and behavioral responses (from page B-32: Biological Opinion, May 9, 2003, U.S. Fish and Wildlife Service, Montana Ecological Services Field Office).

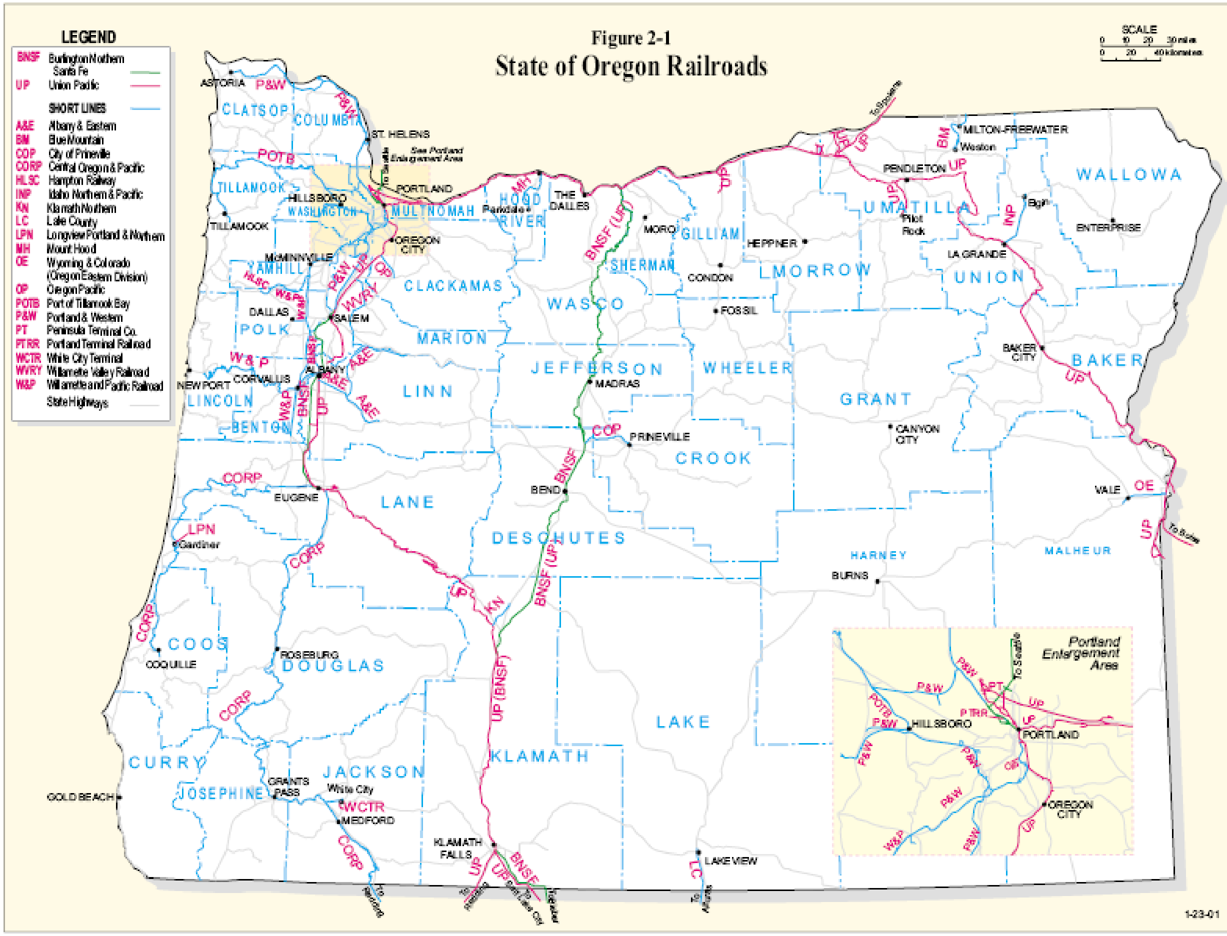
A risk assessment discussing these effects are included in the assessment for Columbia River fish in section II of this document. This assessment has indicated that the risk to species in the Columbia River as a result of fuel or oil leaks would be extremely small.

Transportation by Rail and Truck: Flat-bed semi-tractor trailer trucks or other truck types may be used to transport baled GRG from barge offloading sites to landfills. In certain cases, rail cars will be used to transport baled GRG to landfills. Both of these transportation options would increase truck or rail traffic in Washington, Oregon, or Idaho, depending on the destination landfill.

For example, at the Columbia Ridge Landfill in Oregon, 600 to 750 trucks per month are currently received. A proposed option of unloading barges near Boardman, OR and transporting baled GRG by truck to the Columbia Ridge Landfill would add 125 to 200 additional trucks per month to that landfill. The Columbia Ridge Landfill currently receives approximately 5 unit trains per week with each train containing 60 to 65 railcars (1,200 to 1,400 railcars and 60,000 to 80,000 tons per month). A proposal to unload barges in the Portland, Oregon area and transport GRG by rail to Columbia Ridge Landfill, would add an additional 100 to 150 additional railcars each month to the incoming rail traffic at that landfill.

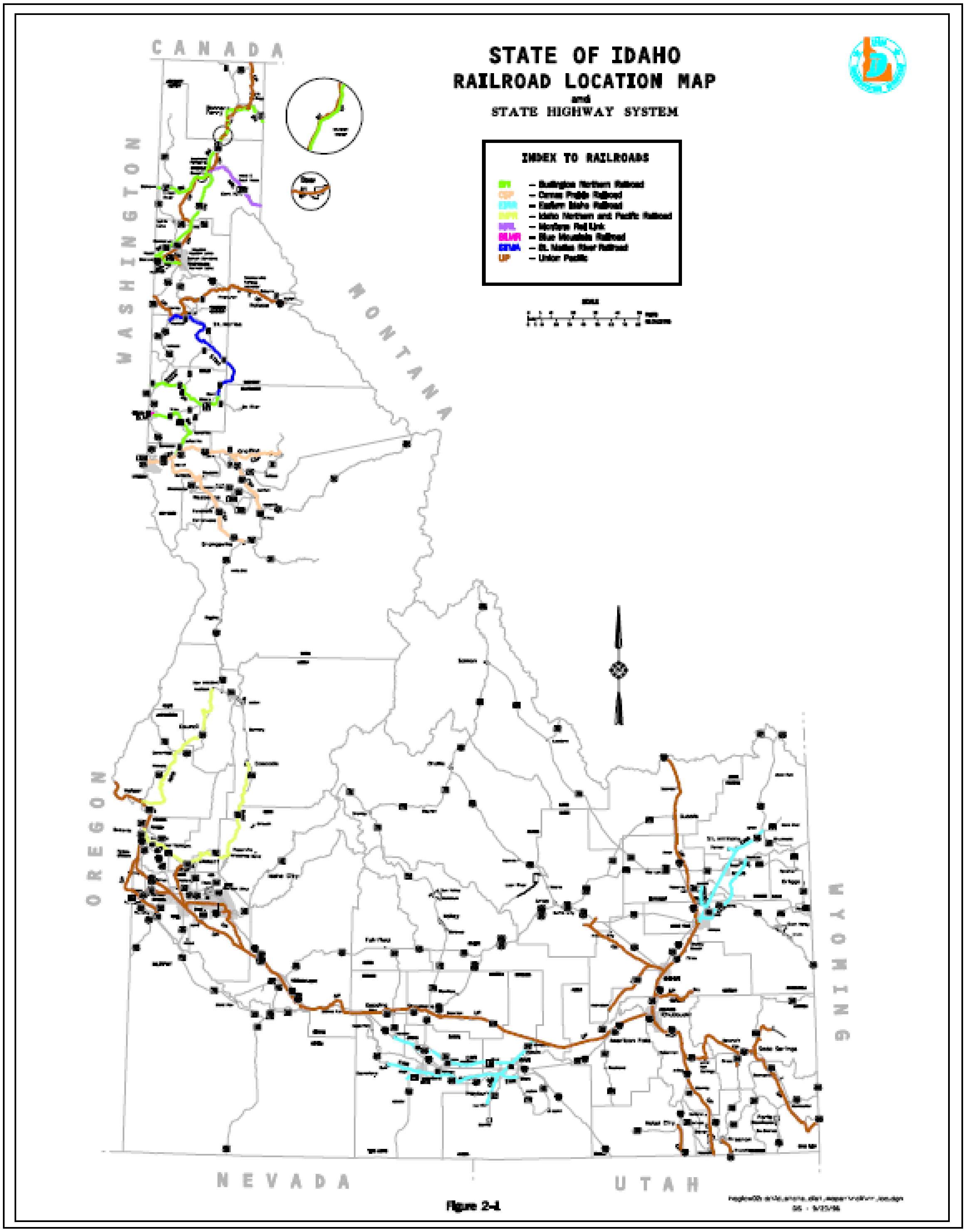
As of 2001, there were 2,387 route miles of railroad in Oregon (ODT, 2001) (figure 4). Currently, the Union Pacific’s east-west line in Oregon that runs along the south bank of the Columbia River and the I-84 corridor into Idaho is proposed for transport of GRG from Portland to a landfill in Gilliam County, Oregon.

Figure 4. Freight railroads in Oregon (ODT, 2001).



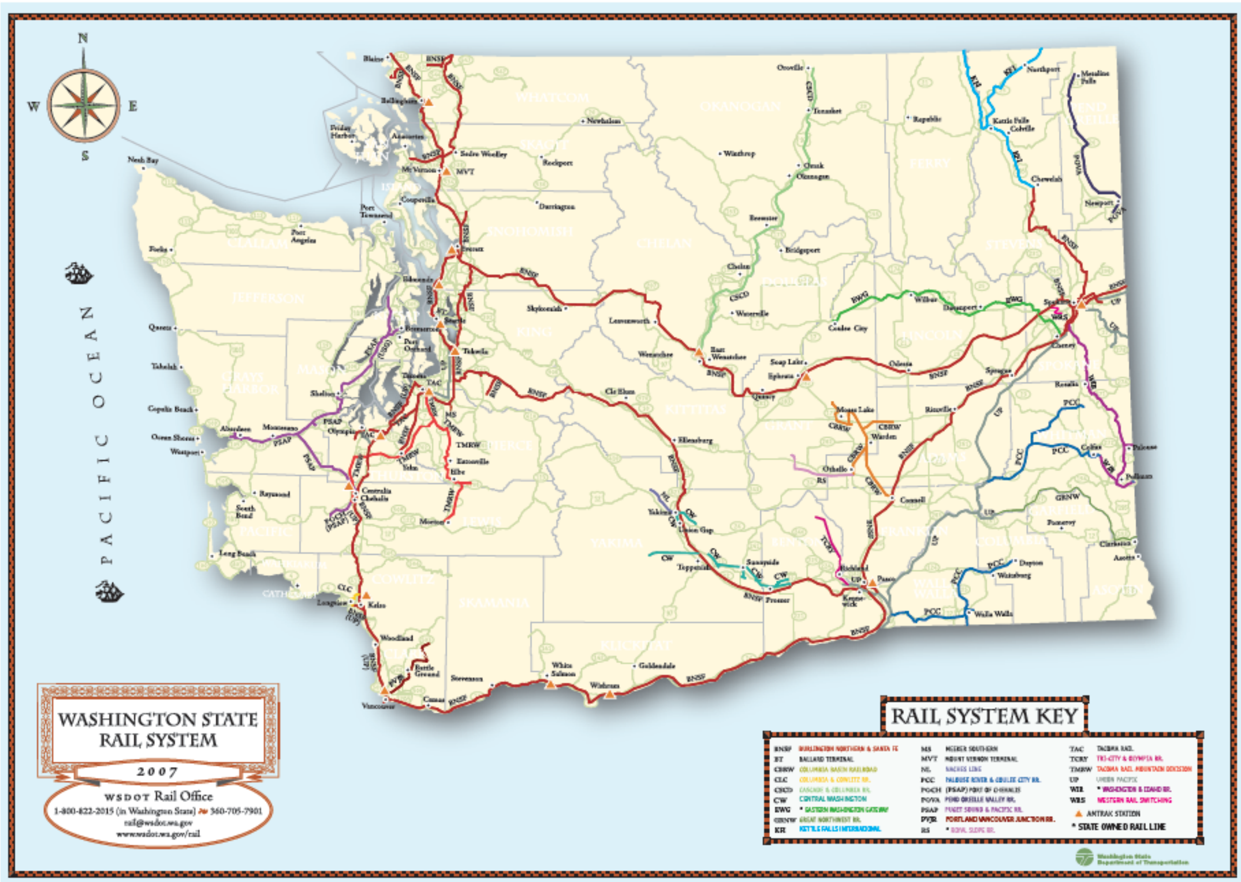
Idaho is served by two Class I Railroads (carriers having revenues in excess of $250 million annually), the Burlington Northern and the Union Pacific. In addition, service is provided by six regional or local railroads. Together, they comprise a 1,940-mile state rail system (ITD, 1996) (figure 5).

Figure 5. Railroads in Idaho (ITD, 1996).



Washington State is served by two Class I railroads, two regional railroads, and 16 active short lines and switching railroads (WSTC, 2006) (figure 6). In total, there are 3,628 miles of rails operated in the state (WSTC, 2006).

Figure 6. Washington State Rail System (WSDOT, 2007).



Potential Effects From Rail and Truck Transportation: Increased rail and truck traffic as GRG bales are transported from unloading sites on the Columbia River to landfills will occur. This traffic increase could increase the likelihood that certain listed species could be struck by trucks or trains. Collisions between wildlife and vehicles result in the loss of wildlife, vehicle damage, and, occasionally, human injuries or fatalities. Between 1986 and 2005 in Yoho National Park in Canada, park staff have recorded over 500 wildlife-vehicle collisions involving large animals. Most victims of highway strikes are large ungulates (deer, elk, and moose), but wolves, coyotes and black bears are also commonly hit. The impact of highway strikes on small mammal, bird, and amphibian populations is unknown, as these collisions are rarely reported.

The following quoted information is from: The relationship between rare carnivores and highways, an update for year 2000. Bill Ruediger, Endangered Species Program Leader, USDA Forest Service, Northern Region, Missoula, Montana

"Carnivores are particularly susceptible to highway mortality because of their large home ranges, low biological productivity and the enormous sized areas required to sustain populations and individuals. Due to the long life spans (over 30 years for grizzly bear), carnivores can continue existing as individuals-without persisting as populations. As mentioned previously, human

caused mortality has been a contributing factor for many species.
Examples of direct mortality on wolves are numerous. In Banff National Park during 1996, there were 11 wolf mortalities caused by collisions with cars, trucks and trains. This was the equivalent of the entire known wolf reproduction for the park and surrounding area. When wolves recolonized NW Montana, two alpha male wolves were killed on I-90 (Bangs, personal communication). The reintroduced wolves as of 2000 are doing well in both Yellowstone National Park and Central Idaho. Vehicle collisions with wolves have become a regular occurrence for these populations. In Weaver's (personal communication) wolf study in Jasper National Park and Paquet's in Banff National Park, highway and railroad mortality averaged 1-2 per pack per year.

Grizzly bear are rarely killed on highways. However, documented fatal collisions have occurred on Highways 93 and 2 in Montana and the Trans-Canada Highway before fencing was employed. The rare occurrences of grizzly mortality are likely due to their general avoidance of highways and their low population numbers and densities."

"Lynx highway mortalities have recently been observed in Colorado, where 10% of the known mortality of a reintroduced population has been vehicle collisions. Clevenger has also seen lynx carcasses on the Trans-Canada Highway. Sixteen of 83 lynx translocated lynx were killed on highways in New York (Brocke et al. 1991)."

"Information from Florida on black bear road kills suggests that while vehicle use of highways in the study area increased by 100% (to 24,000 vehicle trips per day), black bear road kills went from less than five to over 90 in the same period (Gilbert & Wooding, 1996)."

Grizzly bears have been struck and killed by trains; trains between West and East Glacier, Montana killed 13 grizzly bears during the period 1992-2002 (Waller et al. 2005). Railways are another source of human-induced wildlife mortality in Yoho National Park. The Canada Pacific (CP) rail line through Yoho was opened in 1885; today approximately 35 trains travel through the park each day. Since 1986, over 55 animals have been reported killed on the CP rail line, including 25 elk, 11 black bears and 6 wolves. In Banff National Park in Canada, significant amounts of spilled grain have been observed between the rails over the past several years from 6,000 CP hopper cars suspected of leaking grain between the prairies and west coast terminals. Grizzly bears, black bears, wolves, coyotes, elk and deer have been struck and killed as they forage for grain or use the right-of-way for easy passage.

Estimate of Rail Traffic Increase: Using an estimate of 500,000 tons of GRG from Hawaii per year, a bale weight of 1.7 tons, and a transport weight of 112 tons per railcar (based on information submitted by Idaho Waste Systems), a total of about 4,465 railcars would be added to rail transport per year, assuming that all of the GRG is transported by railcar to landfills. In Oregon alone, 63.5 million tons of cargo were transported by rail to, from, within, and through the state in 1999 (Oregon Rail Plan, 2001). This would translate into 566,965 railcars per year. Based on this figure, transport of GRG by rail would result in a less than 1 percent increase in number of railcars per year in Oregon. In 1998, 85 million tons of freight were moved by rail to, from, and within Washington (USDOT, 2002a). This translates to 758,929 railcars. Based on this figure, transport of GRG by rail would also result in a less than 1 percent increase in number of railcars per year in Washington. For Idaho, 18 million tons of freight were moved by rail to, from, and within the state (USDOT, 2002b). This translates into 160,715 railcars. Based on this figure, transport of GRG by rail would result in a 3 percent increase in number of railcars per year in Idaho. These estimates of rail increase are very conservative and assume that all of the GRG from Hawaii would be transported by rail, a scenerio that is unlikely.

Estimate of Truck Traffic Increase: Using an estimate of 500,000 tons of GRG from Hawaii per year, a bale weight of 1.7 tons, and a transport weight of 34 tons per truck (based on information submitted by applicants in WA), a total of 14,706 trips would be added to truck transport per year, assuming that all of the GRG is transported by truck to landfills. In 1998, 220 million tons of freight were transported by highway in Oregon (USDOT, 2002c) (approximately 6,470,588 truckloads), 307 million tons in Washington (USDOT, 2002a) (approximately 9,029,411 truckloads), and 95 million tons in Idaho (USDOT, 2002b) (approximately 2,794,117 truckloads). This results in a 0.2, 0.1, and 0.5 percent increase of truck/highway freight traffic in Oregon, Washington, and Idaho, respectively. These estimates of truck traffic increase are very conservative and assume that all of the GRG from Hawaii would be transported by truck, a scenerio that is unlikely.

Potenial Effects from Barge, Train, Truck, and Bale Transferring Accidents: Short of capsizing (which would be considered a catastrophic event and would be cause to initiate emergency consultation with NMFS and/or FWS), there is little risk of environmental impact from the transport of baled GRG from Hawaii to the mainland United States. Places where there is potential for impact to occur are wherever bales are moved from one staging area or mode of transportation to another. The transfer points include: (1) the staging area in Hawaii where baled GRG is moved, handled, and loaded onto barges, (2) the staging area where bales are transloaded from the barges and loaded onto railcars or trucks; and (3) the final destination where bales are unloaded from rail cars or trucks and placed into the landfill.

At each of the bale transfer points identified above, there is a small potential for dropping a bale into the water or compromising the integrity of one or more bales of GRG that could result in spillage of the contents on the ground or into the water. Information provided by one of the applicants indicates that when bales were dropped from heights ranging from 7.5 feet to 12 feet, the bales did not rupture, but remained intact. Rather than bales rupturing, it is more likely that equipment operators who are handling bales could accidentally puncture bales. Even though puncturing may occur, material compressed to the extent the baled GRG will be (estimated at 1000 kilograms per cubic meter) is likely to be resistant to movement of material out of the bale. In addition, the likelihood of pest species escaping, while not zero, is very low because of the low likelihood of host material being present and of pests surviving the compression and packaging process and any anoxic conditions experienced until the time of the puncture. Even if material did exit the bale upon puncture, in most cases the spilled GRG would be quickly retrieved and the bale patched or repackaged according to the requirements of the compliance agreement. If this were to happen over water, it would be more difficult to retrieve the spilled GRG.

Physical risks that must be considered in such a situation include a physical disruption of the environment caused by the broken bales and the physical retrieval of their strewn contents.

Physical removal of GRG that has been spilled on land will be relatively easy to retrieve. Most, if not all, of the land that will be used during the transfer of bales will be commercial or industrial in nature and not suitable habitat for wildlife. Therefore any cleanup activities are unlikely to have an environmental effect. GRG that is spilled into waterways will be more difficult to retrieve, and some may not be retrievable, resulting in an incremental but permanent degradation of the natural aquatic environment. Since hazardous wastes are not permitted in the bales, any negative impacts will be restricted to physical ones and no chemical pollution is likely to result from the GRG itself.

Bales of GRG could potentially fall from the barge, either in the ocean or in the Columbia River. Bales of GRG will sink to the bottom because of their significant relative density. Bales may remain intact or could break open, depending on conditions. U.S. Army Corps of Engineers (2002, 2003) gave a mean accident rate for barges of 28.3 per billion ton-miles. Of those, only 4 of the 167 accidents on the Columbia River involved freight barges (Marine Safety Offices, 2006). The mean fraction of accidents that might cause bales to rupture was 0.11, estimated from the number of accidents involving hazardous materials which resulted in spills from 1990 to 1997 (see appendix C for APHIS risk assessment). However, applicants must submit spill response plans should bales fall into the water.

The APHIS risk assessments (appendices D-F) analyzed the potential for bale-rupturing accidents based on specific proposals submitted by applicants. Although none of the risk assessments analyzed the transport of 500,000 tons of GRG, they demonstrate the low probability of bale-rupturing accidents for barge, truck, and rail transport. This information is summarized in the below.

- The APHIS risk assessment for Washington State (see appendix D) estimated the annual likelihood of a bale-rupturing accident was 0.03 percent for trucks and 0.37 percent for barges. Mean years to the first bale-rupturing accident for trucks was estimated at 3,333, and that for barges was 130 (USDA, APHIS, 2006). APHIS found a 95 percent chance that the first truck accident would occur only after 171 years, or after 7 years for barge transport. The risk of catastrophic rupture of bales while in transport by truck or barge to Roosevelt landfill is very low (USDA, APHIS, 2006). These risk figures were based on the proposed transport of 300,000 tons of GRG per year.

- The APHIS risk assessment for Gilliam County, Oregon (see appendix E) estimated that for the proposal to offload the baled GRG at the Port of Arlington and truck it to Columbia Ridge Landfill, the risk of a bale-rupturing accident for trucks was 0.045 percent and for barges was 0.41 percent. Mean years to the first bale-rupturing accident for trucks was 2,222, and that for barges was 246. For the alternate route where GRG is off-loaded near Ranier, Oregon and is transported by rail to the Columbia Ridge Landfill, the risk of any bale-rupturing accident by train was 0.002 percent, while that for barges was 0.77 percent. Mean years to the first bale-rupturing accident for trains was 50,000 and for barges, was 130. There wa a 95 percent chance that the first train accident would occur only after 921 years, or after 554 years for barge transport. These risk figures were based on the proposed transport of 120,000 tons of GRG per year. For both options, the risk of catastrophic rupture of bales is low, less than 1 percent.

- The APHIS risk assessment for Elmore County, Idaho (see appendix F) estimated that for a proposal to barge bales 60 miles up the Columbia River and off-load them onto railcars at Rainier, OR, the mean annual probability of a bale-rupturing accident by barge was 0.07 percent, and for trains 0.26 percent. Mean years to the first bale-rupturing barge accident was 645 years, with only a 5 percent chance of happening within 34 years. Mean years to the first bale-rupturing rail accident was estimated to be 1,429 years, with only a 5 percent chance of that accident happening within 74 years. These probabilities are based on a figure of 360,000 tons transported annually.

Potential Effects from Interrelated Actions: An interrelated action of the proposed action is that barges that transport bales of GRG from Hawaii to the mainland will come from the mainland to Hawaii loaded with materials that are not regulated by APHIS. This could include construction materials or any other product that is transported to Hawaii via barge, and rather than these barges returning to the mainland empty, bales of GRG will be transported to the mainland. APHIS has no knowledge of what these materials are because they are unregulated by this agency. Barges transporting materials from the mainland will depart to Hawaii regardless of whether APHIS approves the movement of GRG bales. It is difficult to predict the effects of these interrelated, yet unknown actions.

Potential Effects from Interdependent Actions: There are no known interdependent actions that will result from approval or implementation of this proposal.

Potential Cumulative Effects: Private and state activities, including barging and transport of materials in the Columbia River, movement of freight by truck or rail, and disposal of MSW in landfills occur on a regular basis throughout Oregon, Idaho, and Washington. APHIS does not anticipate any cumulative effects as a result of the proposed action because the increase in barge, rail, and truck transport as a result of this action is not significant. In addition, because the likelihood of bale rupturing accidents via barging, rail transport, and trucking is low, increased pollution/trash in the Columbia River or plant pest release is not expected as a result of this action (USDA, APHIS, 2006, 2007 (see appendices C-F)).

In Hawaii, there are many shipping and boating activities that occur. Some of these include:

Hawaii Superferry is a privately owned inter-island ferry system, that utilizes a 350 foot-long, four-story high-speed catamaran to carry passengers, vehicles and freight between Oahu, Maui and Kauai. These ships will carry upwards of 850 passengers and 280 vehicles each. They will cruise at speeds of up to 45 mph, greatly endangering humpback whales and all marine life in their path. Currently, service to Maui has been suspended until December 1, 2007. An environmental assessment is in preparation by the State of Hawaii to consider the potential for increased traffic around ports, the potential spread of invasive species, and collisions with humpback whales, among other things. The state legislature passed a measure that was signed by the governor on November 6, 2007 that allows the ferry to operate conditionally while an environmental assessment is conducted.

Cruises between the United States mainland and Hawaii are growing in popularity each year. Norwegian/NCL America offers the most Hawaii cruises. Other cruise lines with Hawaii itineraries include Carnival, Celebrity, Holland America, Princess, and Royal Caribbean. These ships offer weekly itineraries visiting ports on the major Hawaiian Islands: Oahu (Honolulu port), Maui (Kahului or Lahaina), Kauai (Lihue), and the Big Island (Hilo and Kailua-Kona). In the first 9 months of 2007, there were 52 cruise ship arrivals in Hawaii compared to 45 in the same period in 2006(Wienert, 2007).

According to a Department of Transportation Freight Management and Operations report, 14 million tons of freight was shipped to, from, and within Hawaii by water in 1998 (USDOT, 2002d). The report predicts 20 million tons for 2010 and 24 million tons by 2020 (USDOT, 2002d). See figure 7 for a Department of Transportation map of domestic water flows to Hawaii, and table 1 for the top 5 commodities shipped to, from and within Hawaii.

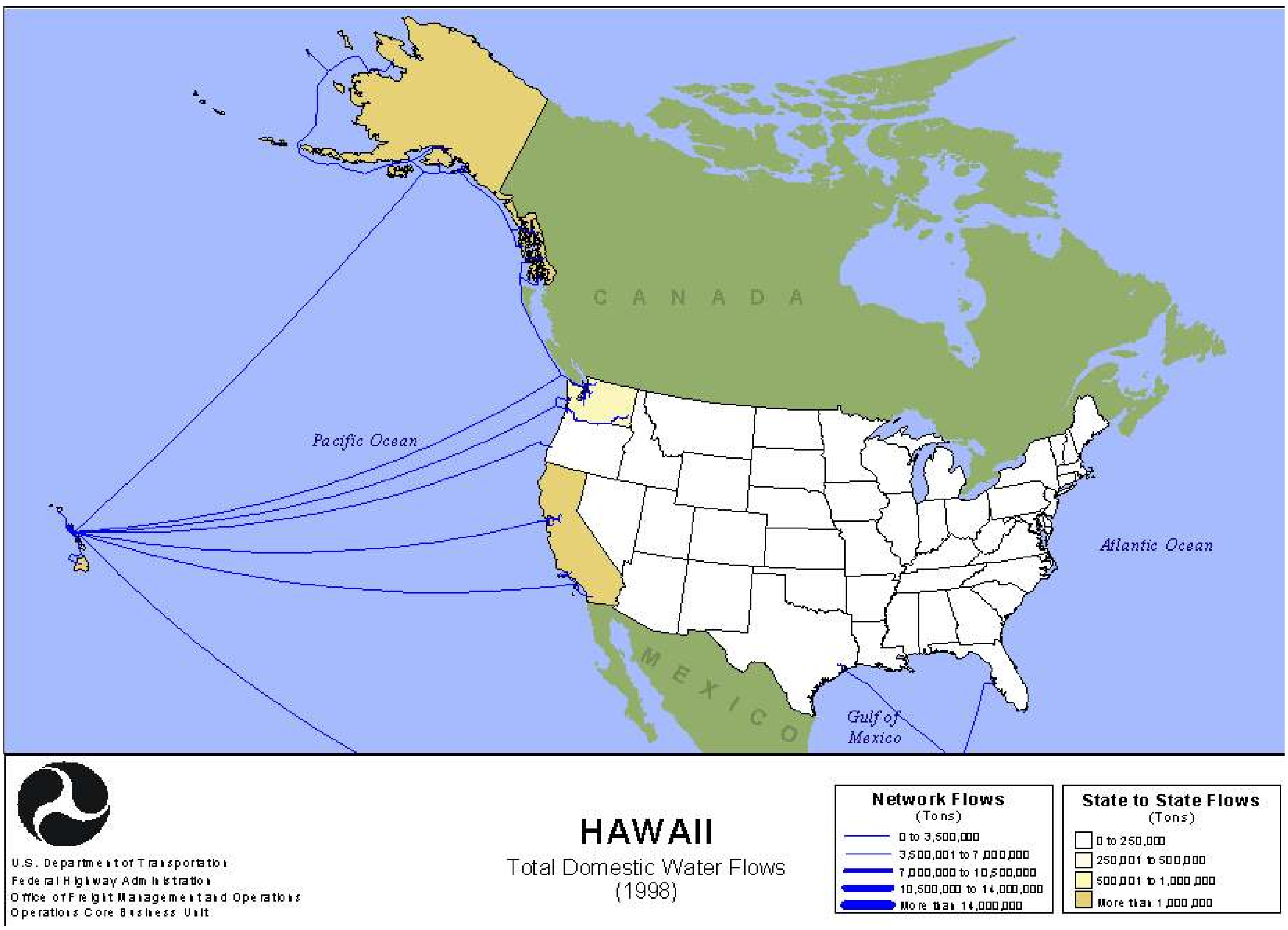


Figure 7. Domestic Water Flows To, From, and Within Hawaii by Water: 1998 (tons) (USDOT, 2002d)

Table 1. Top Five Commodities Shipped To, From, and Within Hawaii (USDOT, 2002d)					
Commodity	Tons (millions)		Commodity	Value (billions $)	
	1998	2020		1998	2020
Crude Petroleum/Natural Gas	12	15	Transportation Equipment	11	21
Nonmetallic Minerals	7	9	Electrical Equipment	7	37
Waste/Scrap Materials	4	9	Machinery	7	39
Petroleum/Coal Products	3	6	Mail/Contract Traffic [a]	5	25
Farm Products	3	3	Crude Petroleum/Natural Gas	1	2

[a] U.S. mail or other small packages.

There is increased potential for collisions with listed marine species and other protected marine mammals from increased vessel traffic in Pacific waters. All forms of marine vessel traffic appear to be on the increase whether from increased visitors or freight to and from the islands. However, the proposed action will not contribute to cumulative impacts on these species because there will be no increase in the number of tugs and barges coming to Hawaii or returning to the mainland as a result of this proposed action. Barges will come to Hawaii bringing construction materials and other cargo not regulated by APHIS. APHIS has no authority over the number of tugs and barges that travel to and from Hawaii. Rather than returning empty to the mainland, barges will carry baled GRG from Hawaii. It is not financially feasible for waste haulers to send barges to Hawaii solely for the purpose of hauling baled GRG.

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II. Listed Species and Program Assessments

Section 7 of the Endangered Species Act (ESA) and its implementing regulations require Federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat. This BA considers the effects of transportation by barge, truck, and train, and landfilling of baled Hawaiian GRG on listed species and designated critical habitat in Oregon, Idaho, and Washington, and on species occurring in the Pacific Ocean where barges would cross from Hawaii to the Columbia River.

APHIS has determined that the proposed action will have no effect on the species or their designated critical habitat listed in tables 2-5, including plants, birds, aquatic species, and butterflies.

APHIS is requesting concurrence with its determination that, with the implementation of certain protection measures (in some cases), the proposed action may affect, but is not likely to adversely affect, the humpback whale, blue whale, fin whale, sei whale, sperm whale, Southern Resident killer whale (and designated critical habitat), green sea turtle, hawksbill sea turtle (and designated critical habitat), olive ridley sea turtle, leatherback sea turtle (and designated critical habitat), loggerhead sea turtle, steller sea-lion (and designated critical habitat), and the Hawaiian monk seal (and designated critical habitat) during the barging of baled GRG from Hawaii to the continental United States.

In the unlikely event that a barge accident were to occur and GRG bales were to fall into the Columbia River, or that oil/fuel would leak from tugs into the river, APHIS requests concurrence with its determination that this may affect, but is not likely to adversely affect salmon, steelhead, and bull trout in the Columbia River. The proposed action may affect, but is not likely to adversely affect the designated critical habitat of these fish.

APHIS is requesting concurrence with its determination that the increased transport of GRG via train or truck, potentially increasing mortality from strikes, may affect, but is not likely to adversely affect the Columbian white-tailed deer, Canada lynx, grizzly bear, northern Idaho ground squirrel, woodland caribou, gray wolf, and the pygmy rabbit (Columbian Basin DPS).

Measures necessary to protect listed species as a result of this and/or future consultations with NMFS and FWS (i.e., steller sea-lion, whales, Hawaiian monk seal, etc.) will be included in all compliance agreements between APHIS and the applicants.

In the occurrence of a catastrophic event, such as the capsizing of a barge loaded with bales of Hawaiian GRG or an oil spill, APHIS will initiate emergency consultation with the Services. Spills and capsizing would be an unpredictable event (temporally/geographically) and therefore, not possible to assess at this time.

PPQ will provide to FWS an annual report for three years (first report should be submitted a year from when GRG shipments from Hawaii commence, and then at he same time for the next 2 years) concerning compliance agreement activities, a summary of any incidents documented on the bale manifests, and any PPQ quarantine-significant pest found in association with the movement of baled garbage from Hawaii. If within those three years no PPQ quarantine-significant pests are found in association with the movement of baled garbage then PPQ will no longer send annual reports. After the three year reporting period, a report will only be issued by PPQ to the FWS and NMFS if formally requested. PPQ will notify FWS and NMFS within 3 business days of any known release of any unwanted organisms.

Listed Marine Species That Could be Affected by Transport of GRG From Hawaii to the Columbia River.

Hawaiian Monk Seal, *Monachus schauinslandi*

Status: The Hawaiian monk seal was listed as endangered on November 23, 1976 (FWS and NMFS, 1976). Critical habitat was designated on March 23, 1999 (USDOC, NMFS, 1999). A revised recovery plan for the Hawaiian monk seal was completed in August, 2007 (NMFS, 2007).

Pertinent Species Information: Hawaiian monk seals have limbs that are relatively short; forelimbs are somewhat flipper-like; hind limbs have fully webbed digits and cannot be turned forward or used effectively for terrestrial locomotion. Pup pelage is woolly and black. Juvenile pelage is silvery gray above and creamy white below, changing to dull brownish above and yellowish below. Adults are silvery gray to brownish above, whitish or silvery gray or yellowish below. Adult males average around 214 cm in total length and 170 kg; adult females may grow a little larger than this and attain much greater mass (e.g., 270 kg) when pregnant. Pup mass is 16-18 kg at birth. (From NatureServe, 2007)

Hawaiian monk seals are found throughout the northwestern Hawaiian Islands (NWHI) including the population's six main reproductive sites in the NWHI: Kure Atoll, Midway Islands, Pearl and Hermes Reef, Lisianski Island, Laysan Island, and French Frigate Shoals (NMFS, 2007). Smaller breeding sub-populations occur on Necker Island and Nihoa Island, and monk seals have been observed at Gardner Pinnacles and Maro Reef. Monk seals are now found throughout the main Hawaiian Islands, where births have been documented on most of the major islands (NMFS, 2007).

The Hawaiian monk seal is in a decline and only approximately 1,200 seals remain (NMFS, 2007).

Threats to this species include low survival of juveniles and sub-adults due to starvation, entanglement of seals in marine debris, predation by Galapagos sharks, human interactions in the main Hawaiian Islands, including recreational fishery interactions, mother-pup disturbance on popular beaches, and exposure to disease, seal-haul-out and pupping beaches are being lost to erosion (NMFS, 2007).

Assessment: Honolulu Harbor, around Barber's Point (west Mamala Bay) and the Port of Hilo in Hilo Harbor, Hawaii are currently proposed harbors for loading baled GRG. It is possible that Hawaiian monk seals may be present within the harbors used by barges transporting baled MSW. Hawaiian monk seals have been sighted in the harbors of Maui and Kauai and some of these harbors are known to have resident seals. For example, in Maalaea Harbor, Maui, a resident monk seal is known to swim almost daily throughout the harbor. That particular individual is tagged and monitored. There is no discussion of Hawaiian monk seals and harbor occurrences in the recovery plan.

Although there is no published evidence that Hawaiian monk seals have been struck by vessels, one seal was found in 1986 with a broken jaw and presumed propeller cuts on his ventrum (NMFS, 2007). Another seal was found off Kona with an injured back and broken vertebrae and may have been due to a vessel strike (NMFS, 2007). As occurrences of Hawaiian monk seals and vessel traffic both increase in the Main Hawaiian Islands, the chance of collision is likely to increase.

The potential for collisions between the tug/barge and Hawaiian monk seals is very low due to the slow tow speed (6-9 knots). In addition, implementation of the proposed action will not result in an increase in vessel traffic because the barges used for transport of baled GRG would be coming to Hawaii and returning to the mainland regardless of APHIS approval of GRG transport. The barges would carry GRG bales rather than returning to the mainland empty. However, the following protection measures will be implemented and included in compliance agreements: Vessel operators will be on the lookout for Hawaiian monk seals when transiting to and leaving harbor waters. In the event that a seal is in the harbor, the vessel must be prepared to stand down until the seal leaves on its own volition. Should a vessel collision occur with a Hawaiian monk seal, immediately contact the National Oceanic and Atmospheric Administration (NOAA) Fisheries hotline at 1-888-256-9840. This incident should be reported to APHIS. APHIS will initiate formal consultation with NMFS.

With the implementation of these measures, APHIS has determined that the proposed action may affect, but is not likely to adversely affect the Hawaiian monk seal.

References:

National Marine Fisheries Services (NMFS). 2007. Recovery Plan for the Hawaiian Monk Seal

(*Monachus schauinslandii*). Second Revision. National Marine Fisheries Service, Silver Spring, MD. 165 pp.

U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Services (NMFS). 1976. Hawaiian Monk Seal Final Regulations. Federal Register, Vol. 41, p.51611-51612, November 23, 1976.

United States Department of Commerce. 1999. National Marine Fisheries Service. Endangered and Threatened Species; regulations Consolidation. Federal Register, Vol. 64, p. 14052-14077, March 23, 1999.

Steller Sea Lion, *Eumetopias jubatus*

Status: The steller sea lion was emergency listed as endangered west of 1440 west longitude (USDOI, FWS, 1990a). It was emergency listed as threatened in locations other than west of 1440 west longitude on April 5, 1990 (USDOI, FWS, 1990b). Critical habitat has been designated for this species.

Pertinent Species Information: (From National Marine Mammal Laboratory http://nmml.afsc.noaa.gov/AlaskaEcosystems/sslhome/StellerDescription.html *last accessed* June 7, 2006).

The steller sea lion is the largest member of the Otariid (eared seal) family. Males may be up to 325 cm (10-11 ft) in length and can weigh up to 1,100 kg (2,400 lb). Females are smaller than males, 240-290 cm (7.5-9.5 ft) in length and up to 350 kg (770 lb) in mass. Males and females are light buff to reddish brown and slightly darker on the chest and abdomen; naked parts of the skin are black. Wet animals usually appear darker than dry ones. Pups are about 1 m (3.3 ft) in length and 16-23 kg (35-50 lb) at birth and grow to about 30-40 kg (65-90 lb) after 6-10 weeks. Pups are dark brown to black until 4 to 6 months old when they molt to a lighter brown. By the end of their second year, pups have taken on the same pelage color as adults.

Bulls become mature between 3 and 8 years of age, but typically are not massive enough to hold territory successfully until 9 or 10 years old. Females reproduce for the first time at 4 to 6 years of age, bearing at most a single pup each year. Pups are born from late May through early July, with peak numbers of births during the second or third week of June. Females stay with their pups for about 9 days before beginning a regular routine of foraging trips to sea. Females mate 11 to 14 days after giving birth. Implantation takes place in late September or early October, after a 3-4 month delay. Weaning is not sharply defined as it is for most other pinniped species, but probably takes place gradually during the winter and spring prior to the following breeding season. It is not uncommon to observe 1- or 2-year-old sea lions suckling from an adult female.

Steller sea lions are distributed across the North Pacific Ocean rim from northern Hokkaido, Japan, through the Kuril Islands, Okhotsk Sea, and Commander Islands in Russia, the Aleutian Islands, central Bering Sea, and southern coast of Alaska, and south to the Channel Islands off California. During the May-to-July breeding season, steller sea lions congregate at more that 40 rookeries, where adult males defend territories, pups are born, and mating takes place. Non-reproductive animals congregate to rest at more than 200 haul-out sites where little or no breeding takes place. Sea lions continue to gather at both rookeries and haul-out sites outside of the breeding season.

The world population of Steller sea lions includes two stocks divided at 144° W longitude (Cape Suckling, just east of Prince William Sound, Alaska). The stock differentiation is based primarily on differences in mitochondrial DNA, but also on differing population trends in the two regions.

Steller sea lions are opportunistic predators, feeding primarily on a wide variety of fishes and cephalopods. Prey varies geographically and seasonally. Some of the more important prey species in Alaska include walleye pollock (*Theragra chalcogramma*), Atka mackerel (*Pleurogrammus monopterygius*), Pacific herring (*Clupea harengus*), Capelin (*Mallotus villosus*), Pacific sand lance (*Ammodytes hexapterus*), Pacific cod (*Gadus macrocephalus*), and salmon (*Oncorhynchus* spp.). Steller sea lions have been known to prey on harbor seal, fur seal, ringed seal, and possibly sea otter pups, but this would represent only a supplemental component to the diet.

In Oregon, numbers have remained relatively stable since 1981 at about 2,000-3,000 animals. In California, numbers have declined, especially in the southern portion of range. Breeding colonies occur in Oregon and British Columbia but not in Washington (nonbreeding occurrences only). Breeding rookeries extend from the central Kuril Islands and the Okhotsk Sea in the west to Ano Nuevo Island and San Miguel Island, California, in the east, though the latter rookery is nearly or actually defunct; none have been seen on the Channel Islands since 1984. (From NatureServe, 2006).

Factors suggested as potential causes for the declines of steller sea-lions in Alaska and Russia include reduced food availability, possibly resulting from competition with commercial fisheries, incidental take and intentional kills during commercial fish harvests, subsistence take, entanglement in marine debris, disease, pollution, and harassment. Steller sea-lions are also sensitive to intrusion at rookeries and haul-out sites. (From NatureServe, 2006).

Assessment: The proposed action would have no effect on steller sea-lion prey. Ship strikes are not reported as a threat to the steller sea-lion and the slow movement of the barges (6-9 knots) would make a strike unlikely.

Marine debris and pollution will be prevented by the measures included in the compliance agreements with waste management companies, including the frequent inspection of bales for breaks, training of waste management personnel in proper handling procedures, and labeling and identification of all bales.

To avoid distubance of rookeries and collisions with steller sea-lions, APHIS will implement the following protection measures:

Vessel operators will maintain a sharp lookout for Steller sea lions and other collision hazards. Operators are advised to post at least one person dedicated to lookout for sea lions on route to the Columbia River.

Tugs and barges will not travel above a speed of 12 knots.

Contact APHIS and NOAA's Northwest Regional Office if involved in a collision: (206) 526-6733. APHIS will re-initiate consultation with NMFS.

No barge will approach within three nautical miles of the Steller sea lion rookeries in Oregon (Rogue Reef: Pyramid Rock and Orford Reef: Long Brown Rock and Seal Rock) and California (Ano Nuevo Island, Southeast Farallon Island, Sugarloaf Island, and Cape Mendocino).

With the implementation of these protection measures, APHIS has determined that the proposed barging of garbage from Hawaii to the mainland United States may affect, but is not likely to adversely affect the steller sea lion or its designated critical habitat.

References:

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.7. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 12, 2006).

United States Department of the Interior, 1990a. Fish and Wildlife Service. Endangered and threatened wildlife and plants; emergency listing of the steller sea lion. Federal Register, Vol. 55, p.13488, April 10, 1990.

United States Department of the Interior, 1990b. Fish and Wildlife Service. Endangered and threatened wildlife and plants; Listing of steller sea lions as threatened under Endangered Species act with Protective Regulations. Vol. 55, p. 12645-12662, April 5, 1990.

Whales

Humpback Whale, *Megaptera novaeangliae*

Status: The humpback whale was first listed as endangered on June 2, 1970 (USDOI, FWS, 1970).

Pertinent Species Information: The humpback whale is a mostly black or gray baleen whale with very long (up to one-third of body length) flippers that often are white or partly white. In front of the paired nostrils, the head is flat and covered with knobs. The rear edge of flippers and flukes is scalloped. The dorsal fin is variable, but often has a hump or step along the front edge. The throat has about 14-35 longitudinal grooves. The baleen generally is all black, up to 70 cm long. The females reach 16 meters and males reach 15 meters. Its blow is bushy and V-shaped. It often raises its flukes high when starting a dive. (From NatureServe, 2006).

It occurs in pelagic and coastal waters, sometimes frequenting inshore areas such as bays. It winters largely in tropical/subtropical waters near islands or coasts, and summers in temperate and subpolar waters. (From Nature Serve, 2006)

It is primarily dependent upon schooling fishes and krill (essentially krill only in the Southern Hemisphere). It feeds singly or in groups. It feeds mainly in high latitudes, though stranded individuals in Virginia and Georgia had eaten sciaenid fishes. It may feed at the surface or while submerged. It employs various foraging methods, including cooperative feeding on prey enclosed in "nets" of exhaled air bubbles. (From NatureServe, 2006).

The humpback whale was depleted by past overharvesting. Currently, it is vulnerable to marine pollution, disturbance by boat traffic, and entanglement in fishing gear. (From NatureServe, 2006)

According to scientists, the shallow, warm waters surrounding the main Hawaiian Islands constitute one of the world's most important habitats for the endangered humpback whale. Nearly two-thirds of the entire North Pacific population of humpback whales migrates to Hawaii each winter. Here, they engage in breeding, calving and nursing activities critical to the survival of their species. Most North Pacific humpback whales begin their annual migrations from the Gulf of Alaska in early fall. They move to three primary locations in the southern latitudes of the North Pacific. One group will travel to the coast of Baja in Mexico. Another will migrate to a group of islands south east of Japan. But the largest population (over 60%) will find themselves in the Hawaiian Islands, a distance of nearly 3500 miles from their feeding grounds in Alaska. This migration takes the humpback approximately 4 to 8 weeks to complete. The majority of the humpbacks that travel to Hawaii end up in the waters off of Maui. It is a "trickle migration with the juveniles usually arriving first, followed by the adult males, adult females, then the pregnant females. (From http://www.whalewatchmaui.com/migration.html *Last accessed* June 5, 2006.)

The Hawaiian Islands Humpback Whale National Marine Sanctuary is comprised of five separate areas abutting six of the major islands of the State of Hawai`i. The five areas of the sanctuary cover relatively shallow offshore areas built up from the sea floor by the development of the Hawaiian Islands chain. (Sources. Hawaii topography: USGS DEM, Ocean bathymetry: ETOPO5, Humpback Whale NMS boundary: NOAA). From http://hawaiihumpbackwhale.noaa.gov/maps/maps.html *Last accessed* June 5, 2006.

Assessment: Adverse impacts to the humpback whale could come from accidental whale/vessel collisions, displacement due to traffic or noise from vessel traffic, or from ingestion of or entanglement in marine debris. Direct collision or displacement conflicts are at a minimum due to the consistent and relatively slow speeds of barge traffic. (From http://www.earthtrust.org/wlcurric/whales.html *Last accessed* June 5, 2006.)

Noise or visual disturbance will not likely occur since marine mammals have demonstrated little behavioral reaction to slow-moving vessels, according to surveys conducted (NMFS, 2006). The baled garbage will be inspected at multiple points in the transport process to ensure that bales are intact and garbage will not be released.

The potential for collisions between the tug/barge and the humpback whale is very low due to the slow tow speed (6-9 knots). However, because the Hawaiian Islands are such an important habitat for the humpback whale, the following protection measures will be implemented:

Within 200 nautical miles of the Hawaiian Islands, barges will not approach or cause an object to approach within 100 yards of any whale species.

Vessel operators will maintain a sharp lookout for whales and other collision hazards. Vessel operators will also look ahead for “blows” (puffs or mists), dorsal fins, tails, etc.

Operators are advised to post at least one person dedicated to lookout for whales from November through May, the peak period for humpback whales in Hawaiian waters.

Tugs and barges will not travel above a speed of 12 knots.

The barges will use appropriate VHF radio protocol or other means to alert other vessels of whales that may be in their path.

Vessel operators will move out of the way of approaching whales.

If possible, vessel operators will attend educational workshops held in Hawaii and sponsored by the State of Hawaii or NOAA Fisheries on whale etiquette.

Vessel operators will call the NOAA Hotline if involved in a collision: (888) 256-9840 or hail the U.S. Coast Guard on VHF channel 16. This incident would also be reported to APHIS and NOAA's Pacific Islands Regional Office. APHIS will re-initiate consultation with NMFS.

With the implementation of these measures, APHIS has determined that the proposed action may affect, but is not likely to adversely affect the humpback whale.

References:

United States Department of Commerce. 2006. National Marine Fisheries Service. Small takes of marine mammals incidental to specified activities; movement of barges through the Beaufort Sea between West Dock and Cape Simpson or Point Lonely, Alaska. Federal Register, Vol. 71, p34064, June 13, 2006.

United States Department of the Interior, 1970. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Conservation of endangered species and other fish or wildlife, United States list of endangered native fish and wildlife. Federal Register, Vol. 35, p. 8491, June 2, 1970.

Blue Whale, *Balaenoptera musculus*

Status: The blue whale was listed as endangered on June 7, 1970 (USDOI, FWS, 1970).

Pertinent Species Information: The blue whale is a very large (the largest living animal) baleen whale; its body is mottled bluish gray. Its head is flat in front of the paired nostrils, broad and nearly U-shaped in dorsal view, with a single median ridge that extends forward from the raised area in front of the nostrils (the ridge does not quite reach the tip of snout). The dorsal fin, located in the last quarter of the back, is very small. The throat has 55-68 longitudinal grooves. Its belly may appear yellowish due to diatom accumulations. Its flippers are long and slim and its baleen is black. The potential maximum length of the blue whale is over 30 meters, with the largest females averaging slightly longer than the largest males. (From NatureServe, 2006).

The blue whale mates May-September in the Northern Hemisphere. Gestation is reported as 11 or 12 months. Adult females bear one calf every 2-3 years. Young are weaned in about 8 months. Females reach sexual maturity in about 10 years. The maximum lifespan is uncertain; it is reportedly only about 20 years or up to 80-90 years. It is usually solitary or in pairs or threes, but may congregate in good feeding areas. It eats primarily krill. Feeding occurs primarily in high latitude waters. (From NatureServe, 2006).

The blue whale occurs throughout the world's oceans. There are three major breeding groups: North Pacific, North Atlantic, and Antarctic; there is perhaps a separate breeding population in the Indian Ocean. It is seen with some regularity in deep coastal canyons off central and southern California, far inside the Gulf of St. Lawrence, and in the Denmark Strait. For all practical purposes the Northern Hemisphere and Southern Hemisphere stocks do not mix. (From Nature Serve, 2006)

Most migrate to high latitude feeding areas for summer and return to lower latitude breeding areas for winter. For example, those that summer off Alaska winter off southern California and Baja California. There may be a basically resident or short distance migratory population off California and Baja California. Of individuals tagged off southern California, where apparently they were feeding or foraging, one moved to waters off northern California and four moved southward to Baja California, two passing Cabo San Lucas and one of these moving an additional 3000 km to near the Costa Rican Dome (an upwelling feature), which may be a calving/breeding area. Data on vocalizations support the idea that blue whales off North America and in the eastern tropical Pacific represent a single stock. Hydrophone recordings suggest possible winter and late summer migrations off Oahu (Hawaii). (From NatureServe, 2006).

The distribution of the blue whale in the western North Atlantic generally extends from the Arctic to at least mid-latitude waters. Blue whales are most frequently sighted in the waters off eastern Canada, with the majority of recent records from the Gulf of St. Lawrence. The blue whale is considered only an occasional visitor in the United States. Records have suggested an occurrence of this species south to Florida and the Gulf of Mexico, although the actual southern limit of the species' range is unknown. (From http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/blue_whale.doc).

The Eastern North Pacific Stock feeds in California waters in summer/fall (from June to November) and migrates south to productive areas off Mexico and as far south at the Costa Rica Dome in winter/spring. Blue whales are occasionally seen or heard off Oregon, but sightings are rare. (From http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/blue_whale.doc).

Blue whales are extremely rare in Hawaii. It is believed that the Hawaiian stock feeds off the Aleutian Islands in summer and winters in offshore waters north of the Hawaiian Islands. There is little published evidence of blue whale sightings in Hawaii, and most evidence comes from acoustic recordings made off Oahu and Midway Islands. The recordings made off Oahu showed bimodal peaks throughout the year, suggesting that the animals were migrating into the area in summer and winter. (From http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/blue_whale.doc).

Historically, the blue whale was over-harvested. Today the species may be negatively affected by food-chain alterations resulting from commercial fishing/whaling. There is concern among some biologists that underwater sound waves, such as those to be transmitted as part of the Acoustic Thermometry of Ocean Climate project, may detrimentally impact marine mammals; all agree that more information is needed on the impact of noise on marine mammals. (NatureServe, 2006).

Blue whales are at least occasionally injured or killed by ship collisions. Several blue whales have been photographed in California with large gashes in their dorsal surface that appear to be from ship strikes. It is estimated that between 9-25% of the whales in the Gulf of St. Lawrence have injuries or scars attributed to contact with ships. The St. Lawrence Seaway has heavy ship traffic during the time of year when blue whales are relatively abundant there. (From http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/blue_whale.doc).

Assessment: This species may be harassed by the noise generated by the tug boats, by physical disturbance from visual or other cues, and collisions with the tug/barge. The potential for collisions between the tug/barge and the blue whale is very low due to the slow tow speed (6-9 knots). Noise or visual disturbance will not likely occur since marine mammals have demonstrated little behavioral reaction to slow-moving vessels, according to surveys conducted (NMFS, 2006). The baled garbage will be inspected at multiple points in the transport process to ensure that bales are intact and garbage will not be released. Therefore, APHIS has determined that the proposed action may affect, but is not likely to adversely affect the blue whale.

However, APHIS will implement the following protection measures:

Vessel operators will maintain a sharp lookout for whales and other collision hazards. Vessel operators will also look ahead for “blows” (puffs or mists), dorsal fins, tails, etc.

Operators are advised to post at least one person dedicated to lookout for whales while on route to the mouth of the Columbia River.

Tugs and barges will not travel above a speed of 12 knots.

Vessel operators will contact APHIS and NOAA’s Northwest Regional Office if involved in a collision: (206) 526-6733. APHIS will re-initiate consultation with NMFS.

References:

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.7. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 7, 2006).

United States Department of Commerce. 2006. National Marine Fisheries Service. Small takes of marine mammals incidental to specified activities; movement of barges through the Beaufort Sea between West Dock and Cape Simpson or Point Lonely, Alaska. Federal Register, Vol. 71, p34064, June 13, 2006.

United States Department of the Interior, 1970. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Conservation of endangered species and other fish or wildlife, United

States list of endangered native fish and wildlife. Federal Register, Vol. 35, p. 8491, June 2, 1970.

Fin Whale, *Balaenoptera physalus*

Status: The fin whale was listed as endangered on June 2, 1970 (USDOI, FWS, 1970).

Pertinent Species Information: The fin whale is a large dark gray to brownish black baleen whale. It has a narrow V-shaped rostrum with a prominent median ridge. The dorsal fin is angled strongly rearward, and is located about one-third the body length forward from the fluke notch. The throat has numerous longitudinal grooves. Many individuals have a whitish chevron on each side of the back above the flippers. The right lower lip and right front baleen are whitish. The left lower lip is dark and the remainder of baleen is streaked with yellowish white and bluish gray. The flippers are fairly long and narrow. The baleen is up to 72 cm long. It grows to about 26.8 meters, with females reaching larger sizes than males. It mates in winter. Gestation lasts 11-12 months. Adult females bear 1 young every 2-3 years. Young are weaned at 6-8 months. It is sexually mature at a minimum age of about 5-6 years in the western Atlantic. The life span may be 40-100 years. (From NatureServe, 2006)

In the North Pacific, the fin whale eats fishes, krill, calanoid copepods, and squid. In the North Atlantic, its primary foods are fishes (e.g., capelin, herring, sand launce), krill, and calanoid copepods. In the Southern ocean, its main diet is krill. In the Gulf of California, it eats euphausiids in winter and spring. Newly weaned young eat crustaceans. Fine fringing on the baleen of young facilitates capture of copepods. (From NatureServe, 2006)

The fin whale is widespread in the Atlantic, Pacific, Indian, and Southern oceans. Populations were greatly reduced by historical commercial whaling; approximately 102,000-122,000 remain from pre-exploitation levels of over 450,000. It is threatened by general deterioration of the marine ecosystem. Most populations apparently have increased little if at all since commercial harvest was ended in the 1970s. The population off the coast of the eastern United States may be increasing. However, a ten-year survey (published in 1989) of prime Antarctic waters yielded far fewer numbers than expected, raising concern. (From NatureServe, 2006)

The fin whale occurs worldwide in temperate and polar waters in several distinct breeding stocks. In the western North Atlantic, it summers north to arctic Canada and Greenland, and winters south to Gulf of Mexico and Caribbean region. In the eastern North Pacific, it summers north to the Chukchi Sea, and winters north to California (From NatureServe, 2006)

Populations of fin whales in all oceans were greatly reduced by historical commercial whaling. They are also threatened by heavy metal pollution from dumped waste in the Mediterranean. Human exploitation of euphausiids in the southern ocean is a potential threat. (From NatureServe, 2006)

Assessment: This species may be harassed by the noise generated by the tug boats, by physical disturbance from visual or other cues, and collisions with the tug/barge. The potential for collisions between the tug/barge and the fin whale is very low due to the slow tow speed (6-9 knots). Noise or visual disturbance will not likely occur since marine mammals have demonstrated little behavioral reaction to slow-moving vessels, according to surveys conducted (NMFS, 2006). The baled garbage will be inspected at multiple points in the transport process to ensure that bales are intact and garbage will not be released. Therefore, APHIS has determined that the proposed action may affect, but is not likely to adversely affect the fin whale.

However, APHIS will implement the following protection measures:

Vessel operators will maintain a sharp lookout for whales and other collision hazards. Vessel operators will also look ahead for "blows" (puffs or mists), dorsal fins, tails, etc.

Operators are advised to post at least one person dedicated to lookout for whales while on route to the mouth of the Columbia River.

Tugs and barges will not travel above a speed of 12 knots.

Vessel operators will contact APHIS and NOAA's Northwest Regional Office if involved in a collision: (206) 526-6733. APHIS will re-initiate consultation with NMFS.

References:

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.7. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 7, 2006).

United States Department of Commerce. 2006. National Marine Fisheries Service. Small takes of marine mammals incidental to specified activities; movement of barges through the Beaufort Sea between West Dock and Cape Simpson or Point Lonely, Alaska. Federal Register, Vol. 71, p34064, June 13, 2006.

United States Department of the Interior, 1970. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife, Conservation of endangered species and other fish or wildlife, United States list of endangered native fish and wildlife. Federal Register, Vol. 35, p. 8491, June 2, 1970.

Sei Whale, *Balaenoptera borealis*

Status: The sei whale was first listed as endangered on June 2, 1970 (USDOI, FWS, 1970).

Pertinent Species Information: The sei whale is a large dark gray baleen whale often with ovoid grayish-white scars. The front edge of its prominent dorsal fin is angled upward more than 40 degrees from the back. The tip of the snout is turned slightly downward. There are many longitudinal grooves on throat. The flippers are pointed and relatively small. The tail fluke is relatively small. The baleen is uniformly ash-black with fine white fringes. The sei whale grows to 18.6 meters in the northern hemisphere and 21 meters in the southern hemisphere, with females reaching the largest sizes (largest males average a couple meters shorter than the largest females). (From NatureServe, 2006)

A single calf is born usually in winter after a gestation period of about 11-12 months. The young nurse for about 5-9 months. The calving interval for individual adult females is 2-3 years. They are sexually mature at an average age of 6-10 years. They usually travel in groups of 2-5, but may concentrate in larger numbers on feeding grounds. The sei whale eats copepods, euphausiids, squid, and various small schooling fishes. It may skim feed on copepods at the surface or gulp feed on krill and small fishes (From NatureServe, 2006)

The sei whale occurs worldwide, but its distribution and movements during much of year are poorly known. It is found from the Coast of Mexico to the Gulf of Alaska in the eastern North Pacific. It is found in the Bering Sea to Japan and Korea in the western North Pacific. It is found in the Gulf of Mexico to Davis Strait (especially off eastern Canada) in the western North Atlantic. It occurs from Norway to Spain and northwestern Africa in the eastern North Atlantic. In the Southern Hemisphere, it occurs from the Antarctic Ocean to the coasts of Brazil, Chile, South Africa, and Australia. (From NatureServe, 2006)

The total population of sei whales is estimated at less than 51,000: about 14,000 in the Northern Hemisphere (mainly in the North Pacific), 37,000 or less in the Southern Hemisphere. A survey of Antarctic waters in the summer of 1989 found only 1,500 in an area where perhaps 10,000 were expected. The North Atlantic population numbers a few thousand. Populations in all oceans have been depleted by overexploitation. (From NatureServe, 2006)

Twelve aerial surveys were made within 25 nautical miles of the main Hawaiian Islands in 1993-98 (Mobley *et al.,* 1998) but no sightings of sei whales were made. A 2002 shipboard line-transect survey of the entire Hawaiian Islands Exclusive Economic Zone resulted in a summer/fall abundance estimate of 77 sei whales (Barlow, 2003). No data are available on the current population trend. Although whales can get tangled in longline fishing gear, between 1994 and 2002, no interactions with sei whales were observed in the Hawaii-based longline fishery. (From National Marine Fisheries Service Stock Assessment Report for Hawaiian Stock of Sei Whale http://www.nmfs.noaa.gov/pr/pdfs/sars/po04seiwhalehawaii.pdf *last accessed* June 8, 2006).

Only 2 confirmed sightings of sei whales and 5 possible sightings were made in California, Oregon, and Washington waters during extensive ship and aerial surveys in 1991-93, 1996, and 2001 (Hill and Barlow, 1992; Carretta and Forney, 1993; Mangels and Gerrodette, 1994; Von Saunder and Barlow, 1999; Barlow, 2003). Green *et al.* (1992) did not report any sightings of sei whales in aerial surveys of Oregon and Washington. The abundance estimate for California, Oregon, and Washington waters out to 300 nautical miles is 56 sei whales (Barlow, 2003). (From National Marine Fisheries Service Stock Assessment Report for Eastern North Pacific Stock of Sei Whale http://www.nmfs.noaa.gov/pr/pdfs/sars/po2003seiwhale_en.pdf *last accessed* June 8, 2006).

Assessment: Sei whales are very rare within the proposed action area. However, this species may be harassed by the noise generated by the tug boats, by physical disturbance from visual or other cues, and collisions with the tug/barge. The potential for collisions between the tug/barge and the sei whale is very low due to the slow tow speed (6-9 knots). Noise or visual disturbance will not likely occur since marine mammals have demonstrated little behavioral reaction to slow-moving vessels, according to surveys conducted (NMFS, 2006). The baled garbage will be inspected at multiple points in the transport process to ensure that bales are intact and garbage will not be released. Therefore, APHIS has determined that the proposed action may affect, but is not likely to adversely affect the sei whale.

However, APHIS will implement the following protection measures:

Vessel operators will maintain a sharp lookout for whales and other collision hazards. Vessel operators will also look ahead for "blows" (puffs or mists), dorsal fins, tails, etc.

Operators are advised to post at least one person dedicated to lookout for whales while on route to the mouth of the Columbia River.

Tugs and barges will not travel above a speed of 12 knots.

Vessel operators will contact APHIS and NOAA's Northwest Regional Office if involved in a collision: (206) 526-6733. APHIS will re-initiate consultation with NMFS.

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Sperm Whale, *Physeter catodon* (=*macrocephalus*)

Status: The sperm whale was first listed as endangered on June 2, 1970 (USDOI, FWS, 1970).

Pertinent Species Information: The sperm whale is found throughout the world's oceans; adult females and young generally stay between 40 degrees N and 40 degrees S latitude. Nonbreeding males range into high latitude waters. Northern and southern hemisphere populations apparently are reproductively isolated from each other. It is pelagic, and prefers deep water, but is sometimes found around islands or in shallow shelf waters (e.g., 40-70 meters). (From NatureServe, 2006)

Sperm whale gestation lasts 14-15 months. Births occur May-September in the Northern Hemisphere and November-March in the Southern Hemisphere. A single young is produced every 3-6 years. Young are weaned in about 1.5-3.5 years, though young may continue to nurse for several years. Females sexually mature at 7-11 years; pregnancy rate gradually declines after age 14. Males may not breed until about 25 years old. Sperm whales may live up to at least 60-70 years. (From NatureServe, 2006)

The sperm whale eats primarily large squids, and sometimes also octopus and various fishes. It dives deeply when foraging; some dives over 1800 meters have been recorded, but most are less than 500 meters. It apparently feeds throughout the year. (From NatureServe, 2006)

The basic social unit of the sperm whale is a mixed school of adult females plus their calves and juveniles (usually about 20-40 individuals). As males grow older they leave this group and form bachelor schools (of variable sizes up to about 50 individuals). The largest males tend to be solitary. (From NatureServe, 2006)

The Hawaiian Islands marked the center of a major nineteenth century whaling ground for sperm whales. Since 1936, at least five strandings have been reported from Oahu, Kauai and Kure Atoll. Sperm whales have also been sighted around several of the Northwestern Hawaiian Islands, off the main island of Hawaii, in the Kauai Channel and in the Alenuihaha Channel between Maui and the island of Hawaii. In addition, the sounds of sperm whales have been recorded throughout the year off Oahu. (From National Marine Fisheries Service Stock Assessment Report for Hawaiian Stock of Sperm Whale http://72.14.203.104/search?q=cache:r7VnMELgVVEJ:www.nmfs.noaa.gov/pr/PR2/Stock_Assessment_Program/Cetaceans/Sperm_Whale_(Hawaii)/POD00spermwhale_hawaii.pdf+sperm+whale+hawaii&hl=en&gl=us&ct=clnk&cd=1 *last accessed* June 9, 2006).

The best estimate for sperm whales occurring in U.S. waters of Hawaii is 66. This abundance underestimates the total number of sperm whales off Hawaii because areas around the Northwest Hawaiian Islands and beyond 25 nautical miles from the main islands were not surveyed when compiling this estimate. (From NOAA Fisheries, Office of Protected Resources, http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhales.htm *last accessed* June 12, 2006.)

The most recent abundance estimate of the California-Oregon-Washington Stock for the period between 1996 and 2001 is 1,233 sperm whales. Sperm whale abundance appears to have been rather variable off California between 1979/1980 and 1996, but does not show any obvious trends. (From NOAA Fisheries, Office of Protected Resources, http://www.nmfs.noaa.gov/pr/species/mammals/cetaceans/spermwhales.htm *last accessed* June 12, 2006.)

Historically, the sperm whale was hunted for spermaceti, ambergris, and oil. It is no longer threatened by direct catching, but entanglement in fishing gear may cause mortality in some areas. It is potentially threatened by ocean pollution and ingestion of plastics. (From NatureServe, 2006)

Assessment: This species may be harassed by the noise generated by the tug boats, by physical disturbance from visual or other cues, and collisions with the tug/barge. The potential for collisions between the tug/barge and the sperm whale is very low due to the slow tow speed (6-9 knots). Noise or visual disturbance will not likely occur since marine mammals have demonstrated little behavioral reaction to slow-moving vessels, according to surveys conducted (NMFS, 2006). The baled garbage will be inspected at multiple points in the transport process to ensure that bales are intact and garbage will not be released. Therefore, APHIS has determined that the proposed action may affect, but is not likely to adversely affect the sperm whale.

However, APHIS will implement the following protection measures:

Vessel operators will maintain a sharp lookout for whales and other collision hazards. Vessel operators will also look ahead for “blows” (puffs or mists), dorsal fins, tails, etc.

Operators are advised to post at least one person dedicated to lookout for whales while on route to the mouth of the Columbia River.

Tugs and barges will not travel above a speed of 12 knots.

Vessel operators will contact APHIS and NOAA's Northwest Regional Office if involved in a collision: (206) 526-6733. APHIS will re-initiate consultation with NMFS.

References:

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 4.7. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 9, 2006).

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Killer Whale, Southern Resident Distinct Population Segment, *Orcinus orca*

Status: The southern resident killer whale was listed as endangered on November 18, 2005 (DOC, NOAA, 2005). Critical habitat was designated on November 29, 2006 (DOC, NOAA, 2006).

Pertinent Species Information: Killer whales are members of the family Delphinidae, which includes approximately 20 genera of marine dolphins. They are the world's largest dolphin. Killer whales are black dorsally and white ventrally, with a conspicuous white oval patch located slightly above and behind the eye. A highly variable gray or white saddle is usually present behind the dorsal fin. Sexual dimorphism occurs in body size, flipper size, and height of the dorsal fin (DOC, NOAA, 2005).

Killer whales occur in all oceans, but it is most common in coastal waters and at higher latitudes, with fewer sightings from tropical regions (NMFS, 2005). In the North Pacific, killer whales occur in waters off Alaska, including the Aleutian Islands and Bering Sea, and range southward along the North American coast and continental slope (NMFS, 2005). Killer whales occur broadly in the world's other oceans, with the exception of the Arctic Ocean (NMFS, 2005).

They are highly social animals that occur primarily in pods of up to 50 animals. Vocal communication is an essential element of the species' complex social structure. They produce numerous types of vocalizations that are useful in navigation, communication and foraging. There are three categories of sounds: echolocation clicks, tonal whistles and pulsed calls. Killer whales hear sounds through the lower jaw and other portions of the head, which transmit the sound signals to receptors in the middle and inner ears.

Killer whales swim at speeds of 5-10 kilometers per hour, but can attain speeds of 40 kilometers per hour. While in the inshore waters of southern British Columbia and Washington, the southern residents spend 95% of their time underwater, nearly all of which is between the surface and a depth of 30 meters. As top-level predators, they feed on a variety of organisms ranging from fish to squid to other marine mammal species. Cooperative hunting, food sharing, and innovative learning are notable foraging traits in killer whales. (From NMFS, 2005)

Three distinct forms of killer whales, termed as residents, transients, and offshores, are recognized in the northeastern Pacific Ocean. There is considerable overlap in their ranges, but the populations display significant genetic differences due to a lack of interchange of member animals. The southern resident population consists of three pods that reside for part of the year in the inland waterways of Washington State and British Columbia (Strait of Georgia, Strait of San Juan de Fuca, and Puget Sound), mainly during the late spring, summer and fall. Pods have visited coastal sites of Washington and Vancouver Island and are known to travel as far south as central California and as far north as the Queen Charlotte Islands. Winter and early spring movements and distribution are largely unknown for the population. Although there is considerable overlap between the ranges of northern and southern residents, pods from the two populations have not been observed to intermix. (From NMFS, 2005)

Threats to the killer whale include reduced prey availability, environmental contaminants, vessel effects and sound, oil spills, disease, and chronic effects from multiple stressors (NMFS, 2005)

Assessment: This species may be harassed by the noise generated by the tug boats, by physical disturbance from visual or other cues, and collisions with the tug/barge. The potential for collisions between the tug/barge and the southern resident killer whale is very low due to the slow tow speed (6-9 knots). Vessel strikes are rare, but do occur and can result in injury, such as in the collision of a southern resident whale with a vessel in the San Juan Islands in July 2005 (NMFS, 2005).

The National Oceanic and Atmospheric administration (NOAA) has little information about the effects of vessel activity on killer whales (DOC, NOAA, 2006). Whale watching vessels are of particular concern. Vessel traffic may have contributed to the decline of the Southern Resident killer whale population through collisions (rare), chemicals such as unburned fuel and exhaust, masking echolocation signals, and disruption of feeding activity resulting in increased energy expenditure and reduced energy acquisition (Bain *et al.,* 2006). However, NOAA is uncertain about the extent to which these effects interfere with the survival and recovery of the Southern Residents but studies have linked vessels with short-term behavioral changes in these animals (DOC, NOAA, 2006). Although there can be occurrence of these whales as far south as central California, the area where the barges will travel is south of the spring, summer, and fall range of the Southern Resident. Thus, there is a low likelihood that barges will interact with Southern Resident killer whales. Therefore, APHIS has determined that the proposed action is not likely to adversely affect the southern resident killer whale. In addition, the proposed action will not adversely modify proposed critical habitat since the mouth of the Columbia River is south of this area and barges will not enter the area where the habitat has been designated.

However, APHIS will implement the following protection measures:

Vessel operators will maintain a sharp lookout for whales and other collision hazards.

Vessel operators will also look ahead for “blows” (puffs or mists), dorsal fins, tails, etc.

Operators are advised to post at least one person dedicated to lookout for killer whales on route to the Columbia River.

Tugs and barges will not travel above a speed of 12 knots.

Contact APHIS and NOAA’s Northwest Regional Office if involved in a collision: (206) 526-6733. APHIS will re-initiate consultation with NMFS.

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Sea turtles

The following five sea turtles are all marine organisms, except when nesting on beaches. The potential impacts due to program activities are the same for all five species. For this reason, the assessment for the green sea turtle, the hawksbill sea turtle, the Olive Ridley sea turtle, the leatherback sea turtle, and the loggerhead sea turtle has been combined and follows the species accounts of the five sea turtles.

Green Sea Turtle, *Chelonia mydas*

Status: The green sea turtle was listed as endangered on July 28, 1978, (USDOI, FWS, 1978).

Pertinent Species Information: The green sea turtle has a brown carapace, often with radiating mottled or wavy dark markings or large dark brown blotches. There are 4 costal plates on each side of carapace. There is one pair of prefrontal plates between the eyes. Its limbs are flattened flippers. The young are black to dark brown above, mainly white below, with a middorsal keel and two plastral keels. They are 4-6 cm at hatching. The adult carapace length usually is 90-122 centimeters (cm) (to 153 cm) and mass is 113-204 kilograms (kg) (to 295+ kg). (From NatureServe, 2006).

Green sea turtles spend most of their lives feeding on sea grasses and algae along the Continental

Shelf. They migrate long distances and return to the same beaches at intervals of 2 to 4 years to nest. Nesting beaches need to be relatively undisturbed by humans and predators, and they must have stable temperatures and moisture for the incubation period.

Turtles in the northern Gulf of California overwinter in a dormant condition. In Hawaii, green sea turtles may bask on beaches mid-morning to mid-afternoon, especially after period of rainy weather (NatureServe, 2006).

The green sea turtle lays 1-8 clutches, averaging about 90-140 eggs, at about two-week intervals, usually every 2-4 years. It nests generally at night. It nests March-October in Caribbean-Gulf of Mexico region, with peak May-June. In Florida, it nests in May-September. It nests April-October, with a peak between mid-June and early August, in Hawaii. Eggs hatch usually in 1.5-3 months. Hatchlings emerge between early July and late December (peak mid-August to early October) in Hawaii. Females mature probably at an average age of 27 years in Florida, but growth rates and hence age of maturity may vary greatly throughout the range (slower growth in Australia, Hawaii, and Galapagos than in Florida and West Indies region). (From NatureServe, 2006)

The threats to the green sea turtle include development of beaches, hunting for their meat, poaching of the eggs, and drowning as a result of being caught in shrimp nets. The State of Florida is working to preserve the nesting areas, and the National Marine Fisheries Service has regulations (50 CFR Part 227) requiring the use of turtle excluder devices (TED's) on larger shrimp boats in both the Atlantic and the Gulf of Mexico (World Wildlife Fund, 1990).

Hawksbill Sea Turtle, *Eretmochelys imbricata*

Status: The hawksbill sea turtle was listed as endangered on June 2, 1970 (USDOI, FWS, 1970). Critical habitat has been designated in Puerto Rico (50 CFR 17.95(c) and 226.71).

Pertinent Species Information: The hawksbill is one of the smaller of the sea turtles. Mature turtles grow to a length of 2 feet and weigh 100 pounds. The name "hawksbill" is derived from the turtle's prominent hooked beak.

The hawksbill sea turtle is primarily carnivorous feeding on jellyfish, sponges, and other sedentary organisms near coral reefs. The species does not migrate and occupies a small range. In tropical waters, the turtle breeds year-round, and the species tends to nest alone. The female will scoop out a nest in an isolated, undisturbed, sandy beach area and deposit about 160 eggs, which incubate in about 50 days.

Global protection needs include: A ban on international commercial trade of shells, protection of nesting beaches and adjacent land and waters from human disturbance, and a requirement of year-round use of turtle excluder devices (NatureServe, 2006).

Currently found throughout the world in tropical seas, the hawksbill sea turtle represents two distinct subspecies in the Atlantic and Indo-Pacific. No population estimates exist. The hawksbill is pelagic and spends most of its time in the open ocean (World Wildlife Fund, 1990). The hawksbill is virtually unknown along coastal waters of the U.S. Pacific continental coast (NMFS and USFWS, 1998).

In Hawaii, there are numerous protected areas for the hawksbill turtle throughout the islands. Kure Atoll at the northwest end of the chain is a wildlife refuge and potentially important to nesting and foraging sea turtles. The northwest atolls and islands between Pearl and Hermes to the northwest and Kaula to the southeast are part of the Hawaiian National Wildlife Refuge complex. The state of Hawaii administers a system of state parks and Marine Life Conservation Districts throughout the main islands, and one coastal natural preserve on Maui. The Hawaii Volcanoes National Park includes coastal areas on the southeast coasts of Hawaii and Maui islands. Honaunau and Pu'u Kohola are also national parks with coastal areas along the coast of Hawaii Island. All of these areas afford protection for foraging and nesting sea turtles in Hawaii. (From NMFS and USFWS, 1998).

Olive Ridley Sea Turtle, *Lepidochelys oliveacea*

Status: The olive ridley sea turtle was listed as endangered in the breeding colony populations on Pacific coast of Mexico and threatened wherever found other than where listed as endangered on July 28, 1978, (USDOI, FWS, 1978).

Pertinent Species Information: (From NOAA Fisheries, National Marine Fisheries Service, Office of Protected Resources, Olive ridley turtle species account. < http://www.nmfs.noaa.gov/prot_res/species/turtles/olive.html> *last accessed* June 6, 2006.)

The olive ridley is a small, hard-shelled marine turtle, one of the two species of the genus *Lepidochelys*, and a member of the family Cheloniidae. The species may be identified by the uniquely high and variable numbers of vertebral and costal scutes. Although some individuals have only five pairs of costals (the number shown by almost all individuals of the congener *Lepidochelys kempii*), in nearly all cases some division of costal scutes occurs, so that as many as six to nine pairs may be present. They are primarily carnivorous, eating jellyfish, shellfish, and other marine animals. Algae may also be an important dietary component.

The most dramatic aspect of the life history of the olive ridley is the habit of forming great nesting aggregations, generally known as "arribadas." Although not every adult olive ridley participates in these arribadas, the vast majority of them do. Formerly these nesting concentrations occurred at several beaches along the Pacific coast of Mexico, including Piedra del Tlacoyunque, Bahia Chacahua, and El Playon de Mismaloya, but in recent years the Mexican arribadas have been largely restricted to La Escobilla, although smaller nesting concentrations have been reported from Morro Ayuta. In Costa Rica, a major nesting aggregation is found at Ostional, on the Nicoya Peninsula, and smaller arribadas occur at Nancite, in the Santa Rosa National Park. Smaller arribadas also occur in Nicaragua at La Flor and Chacocente and at several localities in Panama. In the Indian Ocean, four arribada sites have been reported in the Indian State of Orissa, the most important being Gahirmatha Beach. In the Atlantic, only small arribadas, numbering at most a few hundred animals per night, have been reported from a single locality.

Individual olive ridleys may nest one, two or three times per season, typically producing 100-110 eggs on each occasion. The internesting interval is variable, but for most localities it is approximately 14 days for solitary nesters and 28 days for arribada nesters. The genus is also unique in that ridleys of both species commonly, and probably typically, nest each year, without intervening non-breeding seasons as shown by dermochelyids and other cheloniids. The ridleys nesting in an arribada could not be sustained by the productivity of immediately adjacent marine ecosystems, and the species is indeed migratory. Recent investigations show that olive ridleys reside in oceanic habitats of the eastern Pacific Ocean during the non-reproductive portion of its life cycle.

Despite its abundance, there are surprisingly few data relating to the feeding habits of the olive ridley. However, those reports that do exist suggest that the diet in the western Atlantic and eastern Pacific includes crabs, shrimp, rock lobsters, jellyfish, and tunicates. In some parts of the world, it has been reported that the principal food is algae.

The range of the olive ridley is essentially tropical. In the eastern Pacific nesting takes place from southern Sonora, Mexico, south at least to Colombia. Non-nesting individuals occasionally are found in waters of the southwestern United States. They occur abundantly in Pacific Colombia and Ecuador, but only in small numbers in Peru and Chile.

The olive ridley has been recorded occasionally from Galapagos waters, but it is essentially very rare throughout the islands of the Pacific, and indeed even in the western Pacific it is scarce everywhere, although widespread low-density nesting occurs. In the Indian Ocean it only achieves abundance in eastern India and Sri Lanka, although minor nesting occurs alongside the green turtles at Hawke's Bay, Pakistan, and some nesting also occurs in New Britain, Mozambique, Madagascar, peninsular Malaysia, and various other localities.

Washington State has only a single olive ridley record, a turtle that was found dead in Grays Harbor County. Oregon has two records. They are rarely found in waters north of southern California. (Richardson, 1997) In Hawaii, olive ridley turtles are rarely seen; nesting has only been recorded once, on Maui in 1985.

In the Atlantic Ocean, the olive ridley occurs widely, but probably not in great abundance, in waters of West Africa, from about Mauritania southward at least to the Congo. In the western Atlantic, nesting formerly occurred abundantly in eastern Surinam, as well as in western French Guiana and northwestern Guyana. Non-nesting individuals occur regularly as far west as Isla Margarita and Trinidad, but they rarely penetrate any further into the Caribbean than this. The species occurs in Brazil, and nests in the states of Bahia and Sergipe, but it seems to be rare. Because of the continued existence of several large arribadas, it is probable that the olive ridley is, in terms of absolute numbers of adult individuals in existence, the most abundant sea turtle species in the world. Nevertheless, there is evidence of downward trends at several arribada beaches. The various populations are under considerable stress, and the concentration of such a large proportion of the reproductive animals into a few arribadas may be a liability, not only in that such aggregation facilitates industrial-scale exploitation, as it has in Mexico as well as on the feeding grounds in Ecuador, but also because arribadas do not seem to be an efficient method of guaranteeing maximum reproductive efficiency. Indeed, at the relatively undisturbed arribada beach of Nancite, within Santa Rosa National Park, Costa Rica, it has been estimated that only about 5% of eggs laid actually produce hatchlings.

The number of ridleys nesting during an arribada is difficult to count, although methodologies to estimate arribada size have been developed that are useful if nesting is well supervised by competent biologists. On the other hand, estimates by laymen of numbers of turtles in a given arribada are probably so inaccurate as to be useless. Because nesting in successive years is commonplace for olive ridleys, and may well be the norm for the species, the erratic nesting population trend lines often shown by loggerhead or green turtle populations, that very rarely nest in successive years, are not shown by olive ridley populations. It is thus much easier and more justified to draw conclusions about overall ridley population trends from a few years of comprehensive nest counts than it is for those species with multi-year nesting cycles.

Threats include: pesticides, heavy metals and PCB's, oil spills, consumption of marine debris such as plastic bags, plastic and styrofoam pieces, tar balls, balloons and raw plastic pellets, and in areas where recreational boating and ship traffic is intense, propeller and collision injuries are not uncommon.

Leatherback Sea Turtle, *Dermochelys coriacea*

Status: The leatherback sea turtle was listed as endangered on June 2, 1970 (USDOI, FWS, 1970). Critical habitat has been designated in the Virgin Islands (50 CFR 17.95(c) and 226.71).

Pertinent Species Information: The leatherback sea turtle is the largest sea turtle in the world and is known to migrate great distances. It spends most of its adult life in the open ocean, entering shallow waters only at breeding time. It eats twice its body weight of jellyfish each day with supplements of soft-bodied creatures. The turtles grow as large as nine feet (2.7 meters) long, six feet (1.8 meters) wide and weigh over 1,000 pounds (454 kilograms). Leatherback turtles are covered in a namesake rubbery shell and can dive 4,922 feet (1,500 meters) deep in search of soft-bodied prey like jellyfish.

Leatherback turtles roam tropical and sub-tropical waters of the Pacific, Atlantic, and Indian Oceans. They are found as far north as the British Isles to as far south as Australia.

The United States nesting beaches include barrier islands in south central Florida from Vero Beach to Boca Raton. The other nesting area is on St. Croix in the U.S. Virgin Islands. Nesting begins in March and continues until July. The females come ashore at night and lay about 35 eggs. The eggs incubate approximately 60 days before hatching.

Leatherbacks are commonly seen by fishermen in Hawaiian offshore waters, generally beyond the 100-fathom curve but within sight of land. Sightings often take place off the north coast of Oahu and the Kona coast of Hawaii. North of the Hawaiian Islands, a high seas aggregation of leatherbacks is known to occur at 35°-45°N, 175°-180°W.

The major threat is egg collecting. It is jeopardized to some extent by destruction/degradation of nesting habitat. In Malaysia, a major decline was attributed primarily to mortalities associated with high seas fisheries and to a long history of egg exploitation. Mortality associated with the swordfish gillnet fisheries in Peru and Chile represents the single largest source of mortality for East Pacific leatherbacks. Many eggs are lost to beach erosion in some areas; short-term erosion and accretion cycles along a nesting beach in the Virgin Islands resulted in an annual loss of 40-60% of the nests, though nest relocations recently have reduced this loss. Nesting females are slaughtered in some areas (e.g., Guyana, Trinidad, Colombia, Pacific coast of Mexico). Ingestion of plastics could be an important mortality factor. Collisions with boats and entanglement in fishing gear (especially offshore driftnets) result in some mortality, as does the ingestion of plastic refuse in the ocean. Pollution of ocean waters may pose problems. Beach development and illumination may make beaches unsuitable for successful reproduction. Other threats include beach erosion, beach armoring, beach nourishment, artificial lighting, beach cleaning, increased human presence, recreational beach equipment, exotic dune and beach vegetation, nest loss to abiotic factors, predation, and poaching. (From NatureServe, 2006).

Loggerhead Sea Turtle, *Caretta caretta*

Status: The loggerhead sea turtle was listed as threatened on July 28, 1978 (USDOI, FWS, 1978).

Pertinent Species Information: The loggerhead sea turtle is a reddish-brown sea turtle with a relatively large head. It has 5 or more costals (pleurals) on each side of the carapace. Three (usually) or 4 large poreless scutes are found on the bridge between shells. Its limbs are flattened flippers. The tail of adult males (extends past tips of back-stretched hind flippers) is much longer than that of adult females (barely reaches rear edge of carapace). The young are brown or reddish-brown dorsally and have 3 dorsal keels and 2 plastral keels. The adult carapace length is usually 70-125 centimeters (cm) (to 122+ cm), mass 70-180 kilograms (kg) (to 227+ kg). The hatchling shell length is 4-5 cm, with a mass of about 20 grams. (From NatureServe, 2006)

It is carnivorous and has strong jaws to crush heavy-shelled mollusks and crustaceans. From May to August adult females lay an average of two clutches of eggs at 13-day intervals. Each clutch size is approximately 120 eggs. The eggs incubate for 2 months, with the hatchlings emerging, usually at night, and making their way to the ocean. The females require well-drained dunes, clean sand, and grassy vegetation for nesting.

In the central North Pacific, loggerheads travel westward and move seasonally north and south, primarily through the region 28-40 N latitude (J. Polovina, personal communication) (Oahu latitude is 21.433 N). Few loggerheads are found in Hawaii. Most nesting occurs in Japan. Juveniles are rarely seen in Hawaii, and generally north of 22 degrees latitude (http://www.hawaii.gov/dlnr/dar/pubs/sawcs/mr_loggerhead.pdf *last accessed* June 14, 2006).

The factors affecting the decline of the loggerhead sea turtle are habitat destruction, predation, and drowning from being caught in shrimp nets. The States of North Carolina, South Carolina, Georgia, and Florida are taking steps to prevent beach destruction and predation, and the Atlantic and Gulf shrimpers are using TED's (50 CFR Part 227) to prevent drowning (World Wildlife Fund, 1990).

Assessment for Sea Turtles: Sea turtles occur within the proposed action area and may be harassed by the noise generated by the tug boats, by physical disturbance from visual or other cues, by marine debris entanglement or ingestion, and collisions with the tug/barge. The potential for collisions between the tug/barge and these turtles are very low due to the slow tow speed (6-9 knots). The baled garbage will be inspected at multiple points in the transport process to ensure that bales are intact and garbage will not be released. The proposed action will have no effect on beach habitat or nesting activities of these turtles.

Although the potential for collision of barges with sea turtles is low due to the slow vessel speed, APHIS will implement the following protection measure:

Vessels will operate at low speeds and have observers look out for sea turtles in Hawaii to avoid direct encounters with them.

Should vessel collisions with sea turtles occur, this incident will be reported to APHIS and NOAA's Pacific Islands Regional Office at 808-983-5730. APHIS will re-initiate consultation with NMFS.

With the implementation of these measures, APHIS has determined that the proposed action may affect, but is not likely to adversely affect the green sea turtle, the hawksbill sea turtle, the olive ridley sea turtle, the leatherback sea turtle, or the loggerhead sea turtle. Designated critical habitat of the hawksbill and leatherback sea turtles does not occur in the program area.

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Fish Species That Occur in the Columbia River That Could be Affected by Transport of GRG by Barge

The potential impacts due to program activities are the same for all listed fish species that occur in the Columbia River. For this reason, the assessment for these fish have been combined and it follows the species accounts.

Chinook Salmon Life History and Description: Chinook salmon belong to the family Salmonidae and are one of eight species of Pacific salmonids in the genus *Oncorhynchus*. Chinook salmon are easily the largest of any salmon, with adults often exceeding 40 pounds; individuals over 120 pounds have been reported. Chinook salmon are very similar to coho salmon in appearance while at sea (blue-green back with silver flanks), except for their large size, small black spots on both lobes of the tail, and black pigment along the base of the teeth. Chinook salmon are anadromous and semelparous.

Adult female chinook will prepare a spawning bed, called a redd, in a stream area with suitable gravel composition, water depth and velocity. The adult female chinook may deposit eggs in 4 to 5 nesting pockets within a single redd. After laying eggs in a redd, adult chinook will guard the redd from 4 to 25 days before dying. Eggs are deposited at a time to ensure that young salmon fry emerge during the following spring when the river or estuary productivity is sufficient for juvenile survival and growth. Juvenile chinook may spend from 3 months to 2 years in freshwater after emergence and before migrating to estuarine areas as smolts, and then into the ocean to feed and mature.

Juveniles feed on plankton, then later eat insects and small fish. Coastwide, chinook salmon remain at sea for 1 to 6 years (more commonly 2 to 4 years), with the exception of a small proportion of yearling males (called jack salmon) which mature in freshwater or return after 2 or 3 months in salt water. Adults do not feed during the freshwater spawning migration.

Lower Columbia River Chinook Salmon, *Oncorhynchus tshawytscha*

Status: The lower Columbia River ESU chinook salmon was listed as a threatened species on March 24, 1999 (64 FR 14308). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: Critical habitat for this ESU is designated to include all river reaches accessible to listed chinook salmon in Columbia River tributaries between the Grays and White Salmon Rivers in Washington and the Willamette and Hood Rivers in Oregon, inclusive. Excluded are tribal lands and areas above specific dams or above long-standing, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Oregon - Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, Wasco, and Washington; Washington - Clark, Cowlitz, Klickitat, Lewis, Pierce, Pacific, Skamania, Wahkiakum, and Yakima.

Factors contributing to the decline of chinook salmon in this ESU include hatchery introgression, habitat blockages, logging, eruption of Mount Saint Helens, hydropower development, predation, and harvest.

Upper Columbia River Spring-run Chinook Salmon, *Oncorhynchus tshawytscha*

Status: The Upper Columbia River spring-run chinook salmon was listed as an endangered species on March 24, 1999 (64 FR 14308). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: This ESU includes stream-type chinook salmon spawning above Rock Island Dam - that is, those in the Wenatchee, Entiat, and Methow Rivers, as well as the Columbia River and estuary. Designated habitat includes all river reaches accessible to chinook salmon in Columbia River tributaries upstream of the Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River. Counties in Washington include Chelan, Douglas, Okanogan, Grant, Kittitas, Benton, Franklin, Yakima, Klickitat, Walla Walla, Skamania, Clark, Cowlitz, and Wahkiakum. In Oregon, critical habitat is found in the counties of Gilliam, Morrow, Sherman, Umatilla, Hood River, Wasco, Multnomah, Clatsop, and Columbia.

Factors contributing to the decline of the Upper Columbia River spring-run chinook salmon include Columbia River hydroelectric development which has resulted in a major disruption of migration corridors and affected flow regimes and estuarine habitat. Some populations in this ESU must migrate through nine mainstem dams. Access to a substantial portion of historical habitat was blocked by Chief Joseph and Grand Coulee Dams. There are local habitat problems related to irrigation diversions and hydroelectric development, as well as degraded riparian and instream habitat from urbanization and livestock grazing.

Upper Willamette River Chinook Salmon, *Oncorhynchus tshawytscha*

Status: The Upper Willamette River spring-run chinook salmon was listed as a threatened species on March 24, 1999 (64 FR 14308). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: Major river basins known to support this ESU include the Willamette, Milalla, North Santiam, and McKenzie Rivers, as well as the Columbia River and estuary. The Upper Willamette River ESU is located in portions of Clark, Cowlitz, Wahkiakum, and Pacific, Washington and Clatsop, Columbia, Douglas, Lane, Benton, Lincoln, Linn, Polk, Clackamas, Marion, Washington, Yamhill, Tillamook, and Multnomah counties in Oregon. This ESU includes naturally spawned spring-run chinook salmon populations below Cottage Grove, Dorena, Fern Ridge, Blue River, Big Cliff, and Green Peter Dams.

Although it is unlikely that this species occurs within the action area, it may occur in the Columbia River estuary and is thus being included in this analysis of effects.

Key factors affecting chinook in this ESU include habitat blockages, hatchery introgression, urbanization, logging, hydropower development, and harvest.

Snake River Fall Chinook Salmon, *Oncorhynchus tshawytscha*

Status: The Snake River fall Chinook salmon was listed as a threatened species on April 22, 1992 (57 FR 14653). This status was reclassified to endangered by an emergency interim rule on

August 18, 1994 (59 FR 42529). Critical habitat for the Snake River fall Chinook salmon was designated on December 28, 1993 (58 FR 68543).

Pertinent Species Information: From the Pacific Ocean, Snake River fall salmon enter the Columbia River and travel upstream about 324 miles (520 kilometers) to the Snake River. The majority of spawning is in the mainstream Snake River, from the upper extent of Lower Granite Dam pool to Hells Canyon Dam. Spawning also occurs in the lower reaches of the Imnaha, Grande Ronde, Clearwater, and Tucannon Rivers.

Snake River fall Chinook salmon have declined to low numbers of fish that are thinly spread over a large and complex river system. Hydropower development, water withdrawal and diversions, water storage, harvest, inadequate regulatory mechanisms, and artificial propagation are factors contributing to the decline, and represent a continued threat to the Snake River fall Chinook salmon.

Snake River Spring/Summer Chinook Salmon, *Oncorhychus tahawytscha*

Status: The Snake River spring/summer Chinook salmon was listed as a threatened species on April 22, 1992 (57 FR 14653). This status was reclassified to endangered by an emergency interim rule on August 18, 1994 (59 FR 14653). Critical habitat for the Snake River spring/summer Chinook salmon was designated on December 28, 1993 (58 FR 68543).

Pertinent Species Information: From the Pacific Ocean, Snake River Spring/summer Chinook salmon enter the Columbia River and travel upstream about 324 miles (520 kilometers) to the Snake River. The Snake River contains five principle subbasins that currently produce spring and/or summer-run Chinook. Three of the five subbasins, the Clearwater, Grande Ronde, and Salmon Rivers, are large, complex systems: the others, the Tucannon and Imnaha Rivers, are small systems in which the majority of salmon production is in the mainstream rivers. The Asotin, Granite, and Sheep Creeks are small streams that enter the Snake River and provide small spawning and rearing areas.

Snake River spring/summer Chinook salmon declined to low numbers thinly spread over a large and complex river system. Hydropower development, water withdrawal and diversions, water storage, harvest, inadequate regulatory mechanisms, and artificial propagation are factors contributing to their decline and represent a continued threat to the Snake River spring/summer Chinook salmon's existence.

Columbia River Chum Salmon, *Oncorhynchus keta*

Status: The Columbia River chum salmon was listed as a threatened species on March 25, 1999 (64 FR 14508). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: Chum salmon belong to the family Salmonidae and are one of eight species of Pacific salmonids in the genus *Oncorhynchus*. Chum salmon are anadromous, semelparous, and spawn primarily in fresh water. They have the widest natural geographic and spawning distribution of any Pacific salmonid, primarily because its range extends farther along the shores of the Arctic Ocean than that of the other salmonids. Juvenile chum salmon are distinguished by parr marks of relatively regular height that are smaller than the vertical diameter of the eye, and that are faint or absent below the lateral. Adult chum salmon have greenish to dusky mottling on the sides, with males exhibiting distinctive reddish-purple vertical barring. Adult chum in Washington range in size from 17 to 38 inches, with an average weight of 9 to 11 pounds. Chum salmon spawn in the lowermost reaches of rivers and streams, typically within 100 km of the ocean.

This ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon. Critical habitat for the Columbia River chum salmon is designated to include all river reaches accessible to listed chum salmon (including estuarine areas and tributaries) in the Columbia River downstream from Bonneville Dam, excluding Oregon tributaries upstream of Milton Creek at river km 144 near the town of St. Helens. Also included are adjacent riparian zones. The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Oregon - Clatsop, Columbia, Multnomah, and Washington; Washington - Clark, Cowlitz, Lewis, Pacific, Skamania, and Wahkiakum.

The decline of the Columbia River chum salmon is due to habitat loss and overfishing. Habitat loss is due to channel excavations, dewatering, channelization, flood control, major water diversions, poor forestry practices, and bulkheading of nearshore marine habitats.

Snake River Sockeye Salmon, *Oncorhynchus nerka*

Status: The Snake River sockeye salmon was listed as an endangered species on November 20, 1991 (56 FR 58619). Critical habitat was designated for the Snake River sockeye salmon on December 28, 1993 (58 FR 68543).

Pertinent Species Information: The Snake River sockeye salmon is a member of the trout family (*Salmonidae*). These Pacific salmon are anadromous, spending their adult life in the ocean and traveling into freshwater to spawn and complete their early life histories. Redfish Lake in Custer County, Idaho supports the only remaining run of Snake River sockeye salmon.

Adult Snake River sockeye salmon usually enter Redfish Lake in August, and spawning occurs near shoreline shoals in October. Eggs hatch in the spring, and the juveniles remain in Redfish lake for normally 2 years before migrating to the ocean. Migrants leave Redfish Lake from late April through May. Smolts migrate almost 900 miles through the Salmon, Snake, and Columbia Rivers to the ocean where they usually spend 2 years. Adults return to Redfish Lake in the fourth or fifth year of life, and begin their migration in June and July.

Hydropower development, water withdrawal and diversions, water storage, harvest, predation, and inadequate regulatory mechanisms are factors contributing to the Snake River sockeye salmon’s decline and represent a continued threat to the Snake River sockeye salmon’s existence.

Steelhead Life History and Description: Steelhead exhibit one of the most complex life histories of any salmonid species. Steelhead may exhibit anadromy or freshwater residency.

Resident forms are usually referred to as rainbow trout, while anadromous life forms are termed steelhead. Like all trout, the steelhead are positively separated from the various salmon species by having eight to twelve rays in the anal fin. Steelhead are separated from brook trout, lake trout, and Dolly Varden by the complete absence of teeth at the base of the tongue. Coloration on the back is basically blue-green shading to olive with black, regularly spaced spots. The black spots also cover both lobes of the tail. Steelhead from the ocean are much more silver than resident rainbow trout. Spawning steelhead develop a distinct pink to red strip-like coloration that blends along the side, both above and below the lateral line.

Juvenile steelhead trout are identical to rainbow trout until the period prior to their ocean migrations. Prior to migrating to the sea, juvenile steelhead become very silvery and resemble miniature adults. They are called smolt during this life phase. Steelhead typically migrate to marine waters after spending two years in freshwater. They then reside in marine waters for two to three years prior to returning to their natal stream to spawn. Within the range of west coast steelhead, spawning migrations occur throughout the year, with seasonal peaks of activity. Summer steelhead enter fresh water up to a year prior to spawning. Depending on water temperature, steelhead eggs may incubate in redds for one and one half to four months before hatching as alevins. The alevins remain within the redds, living on the rich nutrients contained in the yolk sac. In 3 to 4 weeks they emerge as fry and feed on small insects and drifting plankton. They then develop into parr (about 3 inches in length) feeding primarily on aquatic and flying insects, although small fish become an increasingly important part of their diet as they grow. Juveniles rear in freshwater from one to four years, then migrate to the ocean as smolts.

Upper Columbia River Steelhead, *Oncorhynchus mykiss*

Status: The Upper Columbia River steelhead was listed as an endangered species on August 18, 1997 (62 FR 43974). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: Critical habitat is designated to include all river reaches accessible to listed steelhead in Columbia River tributaries upstream of the Yakima River, Washington, and downstream of Chief Joseph Dam. Excluded are tribal lands and areas above specific dams or above long-standing, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Oregon - Clatsop, Columbia, Gilliam, Hood River, Morrow, Multnomah, Sherman, Umatilla, and Wasco; Washington - Benton, Chelan, Clark, Cowlitz, Douglas, Franklin, Grant, Kittitas, Klickitat, Okanogan, Pacific, Skamania, Wahkiakum, Walla Walla, and Yakima.
Habitat degradation, juvenile and adult mortality in the hydrosystem, and unfavorable environmental conditions in both marine and freshwater habitats have contributed to the declines of this ESU and represent risk factors for the future. Harvest in lower river fisheries and genetic homogenization from composite broodstock collection are other factors that may contribute significant risk to the Upper Columbia River steelhead.

Snake River Basin Steelhead, *Oncorhynchus mykiss*

Status: The Snake River Basin steelhead was listed as a threatened species on August 18, 1997 (62 FR 43974). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: Critical habitat is designated to include all river reaches accessible to listed steelhead in the Snake River and its tributaries in Idaho, Oregon, and Washington. Excluded are tribal lands and areas above specific dams identified or above long-standing, naturally impassable barriers (i.e., Napias Creek Falls and other natural waterfalls in existence for at least several hundred years). The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Idaho - Adams, Blaine, Boise, Clearwater, Custer, Idaho, Latah, Lemhi, Lewis, Nez Perce, and Valley; Oregon - Baker, Clatsop, Columbia, Hood River, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, and Wasco; Washington - Asotin, Benton, Clark, Columbia, Cowlitz, Franklin, Garfield, Klickitat, Skamania, Wahkiakum, Walla Walla, and Whitman.

Widespread habitat blockage from hydrosystem management, potentially deleterious genetic effects from straying, and introgression from hatchery fish have contributed to the decline of Snake River Basin steelhead.

Lower Columbia River Steelhead, *Oncorhynchus mykiss*

Status: The Lower Columbia River steelhead was listed as a threatened species on March 19, 1998 (63 FR 13347). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: Critical habitat is designated to include all river reaches accessible to listed steelhead in Columbia River tributaries between the Cowlitz and Wind Rivers in Washington and the Willamette and Hood Rivers in Oregon, inclusive. Excluded are tribal lands and areas above Bull Run Dam 2 and Merwin Dam or above long-standing, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Oregon - Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, and Washington; Washington - Clark, Cowlitz, Lewis, Pacific, Skamania, and Wahkiakum.

Habitat loss, hatchery steelhead introgression, and harvest are major contributors to the decline of Lower Columbia River steelhead.

Middle Columbia River Steelhead, *Oncorhynchus mykiss*

Status: The Middle Columbia River steelhead was listed as a threatened species on March 25, 1999 (64 FR 14517). Critical habitat was designated on February 16, 2000 (65 FR 7764).

Pertinent Species Information: Critical habitat is designated to include all river reaches accessible to listed steelhead in Columbia River tributaries (except the Snake River) between Mosier Creek in Oregon and the Yakima River in Washington (inclusive). Excluded are tribal lands and areas above specific dams (Condit Dam and Pelton Dam) or above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Oregon -Clatsop, Columbia, Crook, Gilliam, Grant, Harney, Hood River, Jefferson, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler; Washington - Benton, Clark, Columbia, Cowlitz, Franklin, Kittitas, Klickitat, Pacific, Skamania, Wahkiakum, Walla Walla, and Yakima.

The recent and dramatic increase in the percentage of hatchery fish in natural escapement in the Deschutes River Basin is a significant risk to natural steelhead in this ESU.

Bull Trout, *Salvelinus confluentus*

Status: The bull trout was listed as a threatened species on June 12, 1998 (USDOI, FWS, 1998). Critical habitat was designated on September 26, 2005 but does not occur within the mainstem of the Columbia River (USDOI, FWS, 20045.

Pertinent Species Information: Bull trout, members of the family Salmonidae, are native to the Pacific Northwest and western Canada. Juvenile bull trout have a slender body form and exhibit the small scalation typical of char. The back and upper sides are typically olive-green to brown with a white to dusky underside. The dorsal surface and sides are marked with faint pink spots. They lack the worm-like vermiculations and reddish fins commonly seen on brook trout (*Salvelinus fontinalis*). Spawning bull trout, especially males, turn bright red on the ventral surface with a dark olive-brown back and black markings on the head and jaw. The spots become a more vivid orange-red and the pectoral, pelvic, and anal fins are red-black with a white leading edge. The males develop a pronounced hook on the lower jaw. Bull trout have an obvious notch on the end of the nose above the tip of the lower jaw.

In the United States, bull trout occur in rivers and tributaries throughout the Columbia Basin in Montana, Idaho, Washington, Oregon, and Nevada, as well as the Klamath Basin in Oregon, and several cross-boundary drainages in extreme southeast Alaska.

Bull trout populations are known to exhibit four distinct life history forms: resident, fluvial, adfluvial, and anadromous. Resident bull trout spend their entire life cycle in the same (or nearby) streams in which they were hatched. Fluvial and adfluvial populations spawn in tributary streams where the young rear from 1 to 4 years before migrating to either a lake (adfluvial) or a river (fluvial) where they grow to maturity. Anadromous bull trout spawn in tributary streams, with major growth and maturation occurring in the ocean. Bull trout spawn in the fall, primarily in September or October when water temperatures drop below 9 ºC (48 ºF).

Juvenile bull trout feed primarily on aquatic insects. Adults are opportunistic and largely nondiscriminating fish predators. Adult bull trout, like the young, are strongly associated with the bottom, preferring deep pools in cold water rivers, as well as lakes and reservoirs.

Bull trout in other Columbia River tributaries (e.g. Hood and Wenatchie Rivers) are known to migrate downstream to the mainstem of the Columbia River (FWS, 2002). The extent to which the Lower Columbia River Recovery Unit uses the mainstem of the Columbia River is unknown (FWS, 2002). Adult bull trout do appear to use the mainstem Columbia River for foraging, overwintering and as a migratory corridor and it contains core habitat requirements considered important for bull trout recovery (FWS, 2002).

The decline of the bull trout is primarily due to habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, past fisheries management practices, and the introduction of nonnative species.

The following bull trout core areas occur and feed into the mainstem Columbia River between the mouth of the Columbia River and Klickitat County, where barging of bales of GRG from Hawaii will occur: Klickitat, John Day River, Upper Willamette, Lower Deschutes, Hood River, and Lewis. Only the migratory stage of bull trout from these core areas would be exposed to program activities because only the migratory stage would be present in the mainstem. Little is known about the presence of each individual bull trout subpopulation in the mainstem. Therefore, this assessment will assume that migratory adults from any subpopulation may be present in the mainstem. Freshwater feeding, migration, and overwintering habitats outside core areas, including the Columbia River, are difficult to evaluate due to the nature of this habitat and the limited information on its relationship to core areas. Bull trout from multiple core areas may use the Columbia River, making it extremely difficult to evaluate the overall effect to individual core areas. It is recognized that the Columbia River is an important component of the overall habitat network for migratory bull trout to complete their life history.

The following narratives have been provided by the U.S. Fish and Wildlife Service to describe the baseline condition of the bull trout core areas considered in this risk assessment:

Lewis Core Area

The eruption of Mt. St. Helens affected water quality in the Muddy River and Pine Creek. Riparian vegetation was destroyed and mud flows and ash deposits have contributed high levels of fine sediments to Pine Creek, Muddy River, and the Lewis River above Swift Creek Reservoir. Stream temperatures above 16 degrees Celsius (61 degrees Fahrenheit) have also been measured in Pine Creek although the most current data collected did not exceed 14.3 degrees Celsius. While the exact cause of these elevated stream temperatures are not well understood, it is suspected that channel widening from high levels of timber harvest, and the 1980 mudflows and the loss of riparian vegetation from the Mt. St. Helens eruption, have all contributed to elevated stream temperatures in Pine Creek. Merwin Dam (located on te Lewis River), Yale Dam, and Swift Number 1 and 2 Powerhouses on the Lewis River prevent upstream migration of bull trout and other resident fish. Lack of passage at these hydroelectric facilities within the Lower Columbia River Unit has fragmented bull trout populations and prevented migration into the lower Lewis and Columbia Rivers. Forest management practices in the Lewis River basin have combined to alter flow regimes, riparian conditions and instream habitat. Flood events in the 1970's sent large pulses of sediment into Rush Creek increasing the average channel width 38 percent. The stream has adjusted to these sediment pulses over time by channel narrowing and down cutting.

Key reference: Bull trout draft recovery plan, Chapter 20 (FWS, 2002).

Klickitat Core Area

Water quality is poor in the lower Klickitat (i.e., the area below the confluence with the Little Klickitat), with several tributaries listed as a 303(d) impaired waterway. Parameters that do not meet state water quality in portions of the Little Klickitat, Snyder Canyon, and Swale Creek include temperature, instream flow, fish passage barriers, and fish habitat. Sediment and various chemical contaminants have also been detected in the lower Klickitat, but did not exceed water quality standards. It is important to note that the Service has not completed consultation on water quality standards in terms of potential effects to listed species. In any case, sediment yields in the middle and upper Klickitat are elevated by a legacy of logging, road-building, and grazing impacts. In addition, high natural rates of sediment are associated with extensive glacial outwash from Big Muddy Creek.

Habitat access is limited in the Klickitat through physical, temperature, and instream flow obstructions. Numerous existing and abandoned roads, especially in the lower Klickitat, limit fish access to tributaries and side channel habitat directly or by poor culvert design or placement. Passage is impaired or precluded depending on flow, species, and life history form at Lyle Falls, the Klickitat Hatchery, and Castile Falls. While some of these areas appear to allow at least some passage during certain flow conditions, others prevent passage across a range of flows.

Development in the lower Klickitat for agriculture and a long history of logging and grazing in the middle and upper Klickitat has resulted in an extensively degraded system. As described above, access to off-channel habitat is reduced, and temperatures and flow conditions may be inadequate to support fish. Elevated sediment yields have increased embeddedness and filled pools in some locations. A long history of agriculture and logging has simplified habitat conditions, and all but eliminated refugia.

Development for agriculture, including loss of wetlands, intensive logging, and an extensive road network has substantially modified the hydrology of the Klickitat. This has resulted in pronounced changes in the timing and magnitude of peak flows, storage and recharge capacity. In addition, low flows appear to occur earlier, last longer, and consist of less total streamflow than similarly-sized watersheds..

The road network throughout the core area is extensive, approximating 8 miles/mile^2 across all FMO habitats. In particular, roads in the West Fork Klickitat local population involve 39 stream crossings. Riparian areas have been highly managed or have removed most riparian vegetation in the development and conversion to agriculture in the lower Klickitat. Similarly, logging, road-building, and grazing have substantially impacted all aspects of riparian areas in the middle and upper Klickitat. Human perturbations of the Klickitat have also impacted the natural disturbance regime, nearly eliminating frequent, low-intensity fires and altering all hydrological processes.

(key reference: 2004 Klickitat Subbasin Plan)

Upper Willamette Core Area

The Upper Willamette Core Area is comprised of three local populations, McKenzie River, South Fork McKenzie, and Trailbridge Reservoir. Population estimates indicate less than 300 adult bull trout survive in this core area. Annual redd counts have decreased gradually over the last five years (2000-2004) in the mainstem McKenzie River local population, from a high of 92 redds in 2000, to 61 redds in 2003. Over the same time frame, redd counts have remained stable for the South Fork McKenzie River local population (annual average of 29), and increased in the Trail Bridge local population from two redds in 2000 to 25 redds in 2004. ODFW has been annually reintroducing bull trout fry into historic, unoccupied habitat in the Middle Fork Willamette River. No reproduction has been noted, but adult bull trout were captured in Hills Creek Reservoir in 2003 and 2004, and several age classes of bull trout were collected in and below the bull trout release sites. While there is some limited connectivity within and among local populations in this core area, there are some significant fish passage barriers posed by large dams. Habitat and population baseline conditions for the bull trout in the Willamette Basin are degraded, based on current condition, elevated risk from stochastic events, and the low probability of recolonization through dispersal due to the distance to other bull trout core areas in the lower Columbia River.

Hood River Core Area

The Hood River Core Area is comprised of two local populations, Clear Branch and Hood River. Accurate adult abundance estimates for the Hood River Core Area are not available; however, 300 or less bull trout are believed to occur in the core area. Trap count and snorkel count data support this belief: Snorkel surveys conducted at Clear Branch above the dam found a total of 51 to 200 bull trout annually between 1996 and 2003, while surveys below the dam found a total of 0 to 3 bull trout annually between 1996 and 2003. Some migratory forms occur in the core area, and are believed to overwinter in the lower Hood River and Bonneville Pool of the Columbia River. The two local populations are isolated by an impassable dam. Bull trout are consistently found in the Hood River, the Middle Fork Hood River, and the Clear Branch of Hood River. Bull trout distribution in the East and West Forks of Hood River are based on isolated, infrequent sightings. Historical distribution is believed to approximate current distribution based on existing knowledge. Habitat baseline conditions are degraded in the Hood River Core Area, with numerous water diversions impacting connectivity. The Forest Service has undertaken numerous habitat restoration activities in the Clear Branch local population area.

Lower Deschutes Core Area

The Lower Deschutes Core Area includes all current and historic bull trout habitat in the Deschutes River and tributaries from Big Falls downstream to the confluence of the Deschutes with the Columbia River. It contains five local populations: Shitike Creek, Warm Springs River, Whitewater River, Jefferson/Candle/Abbot river complex, and Canyon/Jack/Heising/mainstem Metolius river complex. Spawning, rearing, foraging, migrating, and overwintering habitats are present in the core area. Redd count data collected between 1998 and 2004 found that bull trout

spawner numbers had generally increased in two of the three Metolius River basin local populations (Jefferson/Candle/Abbot river complex and Canyon/Jack/Heising/mainstem Metolius river complexes combined redd counts increased from 180 in 1998 to 1,045 in 2004), remained stable in the Metolius basin's Whitewater River (data from the Whitewater River are limited, but suggest that the population there is about 30 adults), and remained stable in the lower Deschutes River's Shitike Creek and Warm Springs River populations (Shitike Creek remained steady between 1998 and 2004: 117 redds were counted in 1998, and counts have averaged 137 redds (110 adults) in the last five years. In the Warm Springs River 101 redds were counted in 1998, and redd counts averaged 89 redds (71 adults) in the last five years).
In late summer of 2003, the 91,902 acre B&B fire burned through large areas of the Metolius River basin. It burned areas of the Jefferson/Candle/Abbot river complex and Canyon/Jack/Heising/mainstem Metolius river complex, but did not affect the Whitewater River population. Habitat conditions in the two burned local populations are at elevated risk from increased sediment delivery, with resultant changes including sedimentation of spawning areas, loss of juvenile rearing habitat, increases in peak flows, and increases in stream temperature. Little data exists as to the current use of the mainstem Columbia River by bull trout in this recovery unit.

John Day River Core Area

The Middle Fork John Day Core Area consists of three local populations: Granite Boulder Creek, Big Creek, and Clear Creek. Total numbers of bull trout, consisting of primarily juvenile and subadult fish, were estimated in 1999 to be 1,950 individuals in Big Creek, 640 individuals in Clear Creek, and 368 individuals in Granite Boulder Creek. Resident bull trout are the predominant life history form in the core area, and occupy tributary habitats, but some migratory bull trout have been collected in the Middle Fork John Day River and on spawning locations within tributaries. Sedimentation within this core area is a severe problem. Catastrophic fires burned through the core area in recent years causing erosion and high sediment yields. These effects combine with sedimentation from mining, the removal of streamside vegetation by livestock, and already existing habitat fragmentation to make the path to bull trout recovery difficult.

The North Fork John Day River Core Area consists of seven local populations: Upper North Fork John Day River, Upper Granite Creek, Boulder Creek, Clear/Lightning creeks above ditch, Clear Creek below ditch, Desolation Creek, and South Fork Desolation Creek above the falls. Resident and migratory forms are found in the core area. Overall population trend for the North Fork John Day Core Area is upward. Habitat fragmentation, connectivity and water quality issues still occur. The threats associated with mining still exist, but have been reduced through improved administration and cooperation between the Forest Service and local miners. The presence of brook trout throughout the core area, including the high mountain lakes, continues to be a serious threat to bull trout.

The John Day River Core Area consists of two local populations: Upper John Day River and Indian Creek. Spawning surveys in 1999 and 2000 of bull trout habitat in tributary streams to the mainstem John Day River showed few fish spawning in the local population, with most occupied streams having less than 20 redds. Redd surveys in 1990 estimated that the upper mainstem, and Call and Rail creeks may have more than 300 total spawning adults. Some new, small populations of resident bull trout have been discovered in smaller Core Area streams. Migratory bull trout commonly occur from the John Day River headwaters to the City of John Day, with at least seasonal use as far down as the town of Spray, below the John Day and North Fork John Day rivers' confluence. Indian Creek is seasonally blocked by a diversion that dewaters the lower reaches and creates a migration barrier. The overall trend for bull trout in this core area is upward. Water quality issues, passage problems and competition from brook trout all continue to be major problems.

Anadromous fish access to the John Day River basin is constrained by passage through the 3 mainstem Columbia River dams. Bull trout use of the Columbia River in the vicinity of these dams is not well documented.

Bull Trout Matrix

The following table (table 2) is a summary of the documentation of the environmental baseline and effects of proposed actions on relevant indicators, provided in the document "A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulations Scale", prepared by the U.S. Fish and Wildlife Service. Although the checklist for documentation includes many indicators, including habitat access, habitat elements, channel conditions and dynamics, flow/hydrology, and watershed conditions, APHIS considered only subpopulation characteristics and water quality because these were the relevant factors to the proposed action. Subpopulation characteristics included subpopulation size, growth and survival, life history diversity and isolation, and persistence and genetic integrity of the subpopulation. Water quality included temperature, sediment, chemical contamination, and nutrients. "H" indicates subpopulations functioning at an unacceptable risk, "M" indicates subpopulations functioning at risk, and "L" indicates subpopulations functioning appropriately.

Table 2. Summary of the documentation of the environmental baseline and effects of proposed actions on relevant indicators.

ore Area	Local Population/Potential Local Population	Subpopulation characteristics	Water Quality	Risk Rating
Klickitat	West Fork Klickitat River	H	H	H
John Day River	upper North Fork John Day River	L	L	L
	upper Granite Creek	L	L	L
	Boulder Creek	L	L	L
	Clear/Lightning Creek	L	L	L
	Clear Creek below Pete Mann ditch	L	L	L
	Desolation Creek	L	L	L
	South Fork Desolation Creek	L	L	L
	Clear Creek (in Middle Fork)	M	H	H
	Granite Boulder Creek	M	H	H
	Big Creek	M	H	H
	upper John Day River	L	M	M
	Indian Creek	L	M	M
Upper Willamette	McKenzie River	M	L	M
	South Fork McKenzie	M	L	M
	Trail Bridge	M	L	M
Lower Deschutes	Shitike Creek	M	L	M
	Warm Springs River	M	L	M
	Whitewater River	M	L	M
	Jefferson/Candle/Abbot River	M	M	M
	Canyon/Jack/Heising/ mainstem Metiolus river	M	M	M
Hood River	Clear Branch	M	L	M
	Hood River	M	L	M
Lewis	Rush and Pine Creek	H	L	M
	Cougar Creek	H	L	M

Subpopulations of bull trout considered most at risk based on subpopulation characteristics and water quality were West Fork Klickitat River in the Klickitat Core Area, and Clear Creek, Granite Boulder Creek, and Big Creek in the John Day River Core Area.

Assessment for all listed fish in the Columbia River area:

No disinfectants or detergents are required to be used to clean up spills of GRG that might occur, thus none of these chemicals will enter the Columbia River. Barge traffic on the Columbia River has been estimated to increase by approximately 100 trips per year (1%) as a result of this proposed action but this minimal increase would have no significant effect on any of these fish species. There is no evidence that barges in the Columbia River adversely affect listed species (other than the modifications made to the river to accommodate barges). Chance of pest escape from bales is very low and plant pest escape and establishment would not affect these fish. No animal pests are found in Hawaii that are not already found the continental United States.

However, if an accident were to occur and bales of GRG were to fall into the Columbia River, debris might have an adverse effect on listed fish. Although the Columbia River mainstem is primarily a migration route for salmon and steelhead rather than a spawning area, some ESUs have been found to spawn in the Columbia River mainstem. There is a possibility that if a bale fell from the barge and broke open in the river that GRG could drift into spawning areas.

It is unlikely that a bale would fall from the barge in the mainstem since bales will be well secured on the barge and the chance of a barge accident is very low. U.S. Army Corps of Engineers (2002, 2003) gave a mean accident rate for barges of 28.3 per billion ton-miles. Of those, only 4 of the 167 accidents on the Columbia River involved freight barges (Marine Safety Offices, 2006). Although loss of a bale in the river as a result of a barge accident is unlikely, both applicants have prepared emergency response plans to retrieve bales and loose GRG from the river. All efforts will be made to retrieve lost bales.

The most likely location where bales could be lost is at the transloading points on the Columbia River where bales are unloaded from the barges. Bales could possibly be dropped into the River as they are being unloaded from the barge. Fish spawning areas are not likely to occur at the transloading points because the water would be too deep at the transloading point to accommodate redds. Hazardous materials are prohibited from inclusion in the bales; thus, bale contents would not be toxic to fish. As stated previously, applicants must have emergency response plans in place should bales fall into the water and all efforts will be made to retrieve GRG. These plans will be included as appendices to the compliance agreements. Thus, bales falling into the Columbia River as a result of a barge accident or being dropped during transloading are not likely to adversely affect listed fish in the Columbia River or designated critical habitat. If an entire barge were to capsize in the Columbia River, an emergency consultation with the Services would be initiated. Capsizing would be an unpredictable event (temporally/geographically) and therefore, not possible to assess at this time.

Other than accidental spills, the only effect of barging GRG on bull trout, steelhead or salmon would be water quality if a gas or fuel spill from the barge were to occur. A catastrophic spill of fuel or oil is extremely unlikely and would be considered under an emergency consultation with the Services. However, routine leakage of small amounts of fuel or oil in the Columbia River is considered in this assessment. Effects of the fuel could directly poison bull trout or indirectly affect bull trout by poisoning invertebrate or prey species. Oil and petroleum products vary considerably in their toxicity, and the sensitivity of fish to petroleum varies among species. The sublethal effects of oil on fish include changes in heart and respiratory rates, gill hyperplasia, enlarged liver, reduced growth, fin erosion, impaired endocrine system, and a variety of biochemical, blood, and cellular changes, and behavioral responses (from page B-32: Biological Opinion, May 9, 2003, U.S. Fish and Wildlife Service, Montana Ecological Services Field Office).

Analysis of impacts of a gas/fuel spill:

Duration: Any effect from a gas/fuel spill from a barge is expected to be a short term event whose effects are relaxed almost immediately because of the small size of spills and the rapid evaporation of the most toxic fractions of the fuel.

Disturbance Frequency: For this assessment, APHIS is expecting only two barges hauling GRG from Hawaii per week. The barge companies do not expect to leak fuel or oil from their tugs. However, for this assessment, APHIS is using a conservative estimate that 0.01% of the fuel would be lost through normal operations during the trip up the river for a total of 0.01 gal/hr.

Disturbance Intensity: One company submitted information indicating that 13,500 gallons of fuel will be used to travel from the mouth of the river to Klickitat County (253 miles) over a five day period resulting in the consumption of 112.5 ga of fuel/hr over the five day trip. Based on comments from the companies regarding the lack of leaks from the operation of their tugs and the economics APHIS assumed that 0.01% of the fuel would be lost through normal operations during the trip up the river for a total of 0.01 gal/hr. Converting this to L/hr results in a value of 0.042 L/hr.

APHIS used flow data from McNary Dam which is at river mile 292. There are three other dams below McNary, creating uncertainty when trying to determine concentrations of fuel in the water downstream. APHIS used the Army Corps of Engineer's lowest discharge rate below the dam (30,000 cfs or 224,415 ga/hr) and the average (191,000 cfs or 1,428,775 ga/hr) to estimate the volume of water that is moving down the Columbia River near the location of the landfill.

Minimum water discharge from McNary Dam = 30,000 cfs or 224,415 ga/hr or 849,503.19 L/hr)
Average yearly discharge from McNary Dam = 191,000 cfs or 1,428,775 ga/hr or 5,408,503.6 L/hr)

To relate these numbers to a toxicity value APHIS converted the 0.042 L/hr discharge rate to mg/L/hr using the average density of diesel fuel (0.827 mg/L). Making all the conversions from ga to liter result in:

0.042 L/hr * 0.827 g/mL (density of diesel fuel) = 34,734 mg/L/h of diesel fuel from the tug.

34,734 mg/L/hr // 849,503.19 L/h = 0.04 mg/L/hr (concentration)
34,734 mg/L/hr // 5,408,503.6 L/h = 0.006 mg/L/hr (concentration)

When compared to the 48-hour *Daphnia* EC_{50} value of 1.43 mg/L the above values fall well below the toxicity value. Information from the EPA OW Gold Book Standard states that oil toxicity is highly dependent on the type and grade of fuel so no standards are stated. EPA recommends using a 0.01 factor of the lowest resident species EC/LC_{50} value which in this case (0.0143) would approximate the calculated exposure concentrations at a minimum discharge from the dam but would be an order of magnitude below potential levels at the average yearly

discharge. However the above calculations are extremely conservative and reflect the use of available data using very simple assumptions.
Assumptions:

1. The amount of loss from the tug is considered a conservative estimate of loss over the period of the trip up the Columbia River. The companies have stated that no fuel is lost during normal operations of their tugs; however APHIS recognizes that a sheen could appear during normal operations of the tug. Estimates were based on economic considerations for an acceptable loss of fuel and were considered to occur during the entire five day trip.

2. The calculation of cfs is based solely on discharge rates from the outflow of the McNary Dam and does not consider the volume of water already below the dam. Water discharging from the dam into a large volume of water will substantially increase the volume available for dilution.

3. The calculations assume that the entire length of the Columbia River has the same flow rate. Three dams are located downstream of the McNary Dam, as well as numerous tributaries that drain into the Columbia River and create a volume at the mouth that is one to two orders of magnitude greater than the flow from McNary Dam. The added input from the additional drainages would be expected to dilute any possible oil sheening orders of magnitude below the above calculated values.

4. The above calculations assume that the diesel fuel will be uniformly mixed within the water column which will not be the case since diesel fuel has an average density (0.827 mg/mL) which is less than water from the Columbia River. The lighter diesel fuel will remain at the surface of the water column where the more toxic components will be lost through evaporation and other biotic and abiotic pathways.

5. The comparison of toxicity values expressed as (mg/L) to a rate expressed as (mg/L/hr) creates uncertainty in calculating risk. For reasons discussed above the concentration per hour calculated for this exercise would never been seen in the Columbia River. Making a comparison to toxicity values expressed over 48 to 96 hr is overly conservative and does not represent actual exposure scenarios.

<u>Conclusion from oil/fuel spill risk assessment:</u>

APHIS has determined that because toxicity to listed fish from the routine leakage of fuel or oil in the Columbia River is not expected, the proposed barging of GRG in the Columbia River may affect, but is not likely to adversely affect any listed fish, including salmon, steelhead, and subpopulations of bull trout, including those considered most at risk due to subpopulation characteristics and low water quality within the core area. Direct toxicity to fish or indirect effects from toxicity to prey species are unlikely based on the small amount of fuel to which these species could be exposed to in a large body of water. In addition, barge traffic on the Columbia River has been estimated to increase only 1 percent (100 barges per year) as a result of this proposed action but this minimal increase would have no significant effect on salmon, steelhead, or bull trout. There is no evidence that barges in the Columbia River adversely affect listed species (other than the modifications made to the river to accommodate barges). For these reasons, the proposed action may affect, but is not likely to adversely affect listed salmon, steelhead, and bull trout in the Columbia River. The proposed action is also not likely to adversely affect designated critical habitat of these species.

Potential Risk of Copper Exposure from Barges Containing Hawaiian Garbage to Salmonids

As a means to assess the risk of copper leaching from anti-hull fouling paints used on barges currently using the Columbia River and potentially carrying baled GRG from Hawaii, a conservative exposure estimate was calculated to compare to effect thresholds for salmonids. Several published articles have documented copper-related impacts to the olfaction response of salmonids that could result in sublethal adverse effects. A recent overview of these effects resulted in the establishment of proposed benchmark concentrations that provide threshold concentrations above which dissolved copper concentrations could be expected to impact olfaction and behavior (Hecht *et al*., 2007). Biologically relevant benchmark concentrations to unexposed salmonids were calculated to range from 0.59 to 2.1 µg/L. This range was used as the effects endpoint for this assessment since it is the most sensitive compared to other endpoints that have been documented in other studies.

Exposure concentrations were derived based on multiple conservative assumptions to provide a copper concentration that could be compared to the benchmark values previously discussed. To calculate an exposure concentration, the literature was reviewed to determine potential leaching rates of copper from ships when an anti-hull fouling paint was used. As expected, leaching rates are variable depending on several factors, such as the type of copper-containing paint that is used, when it was applied, and other environmental factors that can affect leaching rates. Hattum *et al.* (2002) in a review of leaching rates used to develop an environmental fate model, documented copper leaching rates ranging from 1 to 101 µg Cu/ cm^2/day with a proposed default rate of 50 µg Cu/ cm^2/day. This value is on the upper end of another study conducted in the United States in-situ and in the laboratory which documented initial laboratory leaching rates of 25 to 65 µg Cu/ cm^2/day and then declining to 8 to 22 µg Cu/ cm^2/day within two months. Variability in the rates was attributed to the different types of copper coatings used in the studies. In-situ leaching rates were much less with rates ranging from 3.8 to 8.2 µg Cu/ cm^2/day (Valkirs *et al.* 2003). The rate used in this assessment was 50 µg Cu/ cm^2/day.

Barges that potentially could be moving baled GRG can range in size from 80 to 100 feet in width and 400 to 450 feet in length. To maximize the amount of leaching, the barge with the largest surface area was used in the calculation which after converting to meters, results in a total surface area of 4,179 square meters. This value was used as a means to determine potential copper loading in a day to surrounding waters in a port. As another means of maximizing copper concentrations, the volume of water was assumed to be small relative to the area of the barge. For this calculation, the water body was assumed to be 200 m by 800 m and 25 m deep, resulting in a total volume of 400 M L. The surface area was based on taking a value approximately five to six times the size of the barge that would allow a tug to move around in the enclosed port. In reality, the volume of water is going to be much greater and will also be influenced by water flow from the river as well as potential tidal influences. In this example the volume of water is assumed to be a closed system with no contribution of flow or tide that would dilute copper concentrations further. Based on this 400 M L volume and the total load of copper from a barge 4,179 sq meters discharging 50 µg Cu/ cm^2/day of copper, the estimated copper concentration would be 0.52 µg/L. This value is below the threshold range of 0.59 and 2.0 µg/L which suggests the risk of copper to salmonids is low. The exposure value should not be interpreted as actual copper levels that could result from current barge use in ports along the Columbia River. The exposure value is extremely conservative since it assumes a relatively high rate of leaching would occur uniformly across the entire surface area of the largest possible barge that could be used. Also, as discussed above, the leaching is occurring into a comparatively small water body than would occur at an actual port without any flow. Significantly more dilution would be expected in ports and rivers where flowing water and tidal fluctuations would dilute copper concentrations. In addition, the calculated exposure concentration in this assessment assumes that 100% of the copper is bioavailable and in the dissolved phase which would not be the case in natural waters that would contain suspended solids, organic carbon, acid volatile sulfides as well as having other water quality parameters that would affect the concentration of dissolved copper (Comber *et al.* 2002).

Based on this assessment, APHIS has determined that anti-hull fouling treatments may affect, but are not likely to adversely affect listed salmonids in the Columbia River. In addition, use of such treatments may prevent invasive species from being carried into the Columbia River.

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Listed Species That Could be Struck by Trucks or Trains Transporting GRG From the Barge Off-load Site to the Designated Landfill

The assessments for listed species that could be struck by trucks or trains have been combined and it follows the species accounts.

Columbian White-tailed Deer, Columbia River DPS, *Odocoileus virginianus leucurus*

Status: The Columbia River DPS of the Columbian white-tailed deer was listed as endangered on March 11, 1967 (USDOI, FWS, 1967).

Pertinent Species Information: The Columbian white-tailed deer is one of 38 recognized subspecies of *virginianus*, a species with a continuous geographic distirbution that extends from southern Canada to South America. There are 2 distinct population segments (DPS) of the Columbia white-tailed deer. The Columbia River DPS is located along the lower Columbia River. The Douglas County DPS, also known as the Roseburg population, located 320 km south, has been delisted because of recovery.

The Columbian white-tailed deer was formerly locally common in the bottomlands and prairie woodlands of the lower Columbia, Willamette, and Umpqua river basins in Oregon and southern Washington. It has been reduced to two distinct populations (NatureServe, 2007). The Columbia River DPS occurs on both banks of the river in Clatsop and Columbia counties, Oregon, and Wahkiakum and Cowlitz counties, Washington (NatureServe, 2007). Most of these occur along the lower Columbia River in Oregon and Washington from Wallace Island (RM 50) downstream to Karlson Island (RM 32).

It prefers wet prairie and lightly wooded bottomlands or "tidelands" along streams and rivers; woodlands are particularly attractive when interspersed with grasslands and pastures. Along the Columbia River, Sitka spruce, dogwood, cottonwood, red alder, and willow dominate the vegetation; in inland habitats, and along the Umpqua River, the tree community consists of Oregon white oak, madrone, California black oak, and Douglas-fir, with a shrubby ground cover of poison oak and wild rose (NatureServe, 2007).

Reasons for decline include habitat degradation, automobile collisions, poaching, entanglement in barbed wire fences, competition with livestock, flooding, disease and parasites, black-tailed deer competition and hybridizationand Roosevelt elk competition (FWS, 1983).

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Canada Lynx, *Lynx canadensis*

Status: The Canada lynx was listed as a threatened species on March 24, 2000 (USDOI, FWS, 2000). Cirtical habitat was designated on November 9, 2006 (USDOI, FWS, 2006).

Pertinent Species Information: The Canada lynx is a medium-sized cat, similar to the bobcat but with longer legs and very large, well-furred paws -- adaptations to the deep winter snows typical throughout its range. It also has unique long tufts of hair on the ears and a short, black-tipped tail. Adult males average 22 pounds in weight and 33.5 inches in length while females are somewhat smaller.

From NatureServe, 2004: In the contiguous United States, the Canada lynx is considered historically resident in 16 states represented by five ecologically distinct regions: Cascade Range (Washington, Oregon), northern Rocky Mountains (northeastern Washington, southeastern Oregon, Idaho, Montana, western Wyoming, northern Utah), southern Rocky Mountains (southeastern Wyoming, Colorado), northern Great Lakes (Minnesota, Wisconsin, Michigan), and northern New England (Maine, New Hampshire, Vermont, New York, Pennsylvania, Massachusetts). Resident populations currently exist only in Maine, Montana, Washington, and possibly Minnesota. The lynx is considered extant but is no longer sustaining self-supporting populations in Wisconsin, Michigan, Oregon, Idaho, Wyoming, Utah, and Colorado. It may be extirpated from New Hampshire, Vermont, New York, Pennsylvania, and Massachussets (USDOI, FWS, 1998). In Canada, the lynx is still widespread and relatively abundant in most of historic range.

Lynx are highly dependent on snowshoe hare, but when hare populations drop they also prey on other small mammals and birds. This change in diet causes sudden drops in the productivity of adult females and survival of young. Prey scarcity suppresses breeding and may result in mortality of nearly all young (Brand and Keith, 1979).

In the western United States, lynx live in subalpine coniferous forests of northern latitudes. The U.S. Forest Service *et al.* (1993) listed three primary habitat components for lynx in the Pacific Northwest: (1) foraging habitat (15-35-year-old lodgepole pine) to support snowshoe hare and provide hunting cover, (2) denning sites (patches of >200-year-old spruce and fir, generally less than 5 acres, and (3) dispersal/travel cover (variable in vegetation composition and structure). Early successional forest stages provide habitat for the lynx's primary prey, the snowshoe hare.

The home range of a lynx can be 5 to 94 square miles and they are capable of moving long distances in search of food.

Canada lynx avoid openings such as clearcuts and grasslands because snowshoe hares also are unlikely to use such areas, and because these areas lack the cover necessary for both species.

Forest management practices that result in the loss of diverse age structure, fragmentation, roading, urbanization, agriculture, recreational developments, and unnatural fire frequencies have altered suitable habitat in many areas. As a result, many states may have insufficient habitat quality and/or quantity to sustain lynx or their prey. Human access into habitat has increased dramatically over the last few decades contributing to direct and indirect mortality and displacement from suitable habitat. Although legal take is highly restricted, existing regulatory mechanisms may be inadequate to protect small, remnant populations or to conserve habitat. Competition with bobcats and coyotes may be a concern in some areas (NatureServe, 2004).

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Grizzly (Brown) Bear*, Ursus arctos horribilis*

Status: The grizzly bear was listed as a threatened species on March 11, 1967 (USDOI, FWS, 1967). On November 17, 2000, the grizzly bear was designated as a non-essential, experimental population in the United States in portions of ID and MT (USDOI, FWS, 2000).

Pertinent Species Information: Grizzly bears are generally larger than black bears and can be distinguished by longer curved claws, humped shoulders, and a face that appears to be concave. A wide range of coloration from light brown to nearly black is common. Guard hairs are often paled at the tips, hence the name "grizzly." Spring shedding, new growth, nutrition and climate all affect coloration (FWS, 1993).

An occasional male may exceed 1,000 pounds but the average weight is closer to 500 - 600 pounds. Females are generally smaller. Adults stand 3-1/2 to 4-1/2 feet at the hump when on all fours, and they may rear up on their hind legs to over eight feet (FWS, 1993).
The muscle structure in grizzly bears is developed for massive strength, quickness, and running speeds up to 25 miles per hour. Movement includes the normal position on all fours and an upright position on the hind legs which improves the opportunity to see and smell (FWS, 1993).

Grizzlies are omnivorous and consume carrion, rodents, fish, grasses, roots, berries, fruits and leaves at varying times of the year. The bears are typically carnivorous during the pregrowing season. As summer progresses and into the fall they began to feed on vegetable matter. They are opportunistic feeders and will prey or scavenge almost any available food (FWS, 1993).
Optimum habitat includes extensive timbered areas adjacent to grassland/herbland, shrubland, or other open feeding sites. Forest cover is very important to grizzly bears fro use as beds (FWS, 1993). In the fall, grizzly bears excavate dens for winter hibernation. Dens are in isolated areas that will be covered with a thick blanket of snow to prevent escape of body-warmed air (FWS, 1993).

Breeding occurs in late May or early June and delayed implantation occurs at about the time that the females enter dens in late October through November. One or two cubs are born in January or February and remain with the mother for about 2.5 years. Due to the length of time it takes to wean the cubs, females only breed every second or third year.

Grizzly bears are normally solitary and shy animals which require large amounts of isolated acreage in which to wander. The occurrence of the bear in North America has been only where spacious habitat insulated it from excessive human-related mortality. Populations in the 48 contiguous States have survived primarily due to the preservation of suitable habitat, as required by the Wilderness Act of 1964.

In the conterminous 48 States, only six areas are known to contain either self-perpetuating or remnant populations. Only 1,000 to 1,100 grizzly bears remain in a few isolated populations in Montana, Wyoming, Idaho, and Washington (USDOI, FWS, 2000).
Reasons for decline of the grizzly bear include human-caused mortality and loss of habitat (USDOI, FWS, 2000).

References:

United States Department of the Interior. 1967. Endangered Species List - 1967. Federal Register, Vol. 32, p. 4001, March 11, 1967.

United States Department of the Interior. 2000. Endangered and Threatened Wildlife and Plants: Establishment of a Nonessential Experimental Population of Grizzly Bears in the Bitterroot Area of Idaho and Montana. Federal Register, Vol. 65, p. 69623, November 17, 2000.

U.S. Fish and Wildlife Service. 1993. Grizzly bear recovery plan. Missoula, MT. 181 pp.

Northern Idaho Ground Squirrel, *Spermophilus brunneus brunneus*

Status: The Northern Idaho ground squirrel was listed as a threatened species on April 5, 2000 (USDOI, FWS, 2000).

Pertinent Species Information: The Northern Idaho ground squirrel is a relatively small member of the genus *Spermophilus* with males typically measuring 9.25 inches -- slightly longer than the average female.

The Northern Idaho ground squirrel emerges in late March or early April, remains active above ground until late July or early August, and spends the rest of the year in hibernation underground (Yensen and Sherman, 1997). Seasonal torpor (a state of sluggishness or inactivity) generally occurs in early to mid-July for males and females, and late July to early August for juveniles.

Northern Idaho ground squirrels consume the roots, bulbs, leaf stems, and flower heads of 45 to 50 plant species during spring and summer (Dyni and Yensen, 1996). Seeds of forbs, lupines, and composites are important, while roots, bulbs, leaf stems, and flower heads are a minor component of their diet (FWS, 2003). To store energy for winter, the ground squirrel must consume large amounts of seed from *Poa* species (bluegrass) and other grasses (Dyni and Yensen, 1996).

The Northern Idaho ground squirrel often digs burrows under logs, rocks, or other objects. Dry vegetation sites with shallow soil horizons above basalt bedrock are preferred. Nesting burrows are found in well-drained soils greater than 3 feet deep (Yensen *et al.,* 1991), in areas not covered with trees or used by Columbian ground squirrels.

The Northern Idaho ground squirrels is known to occur in dry, rocky meadows associated with deeper, well-drained soil surrounded by coniferous forests of ponderosa pine and/or Douglas-fir at elevations of 3,000 to 5,400 feet in Adams and Valley Counties of western Idaho (FWS, 2003).

In the spring of 2002, the northern Idaho ground squirrel population was estimated to be 450 to 500 animals (FWS, 2003). It is primarily threatened by habitat loss due to forest encroachment into meadow habitats (FWS, 2003). The subspecies is also threatened by competition from the larger Columbian ground squirrel, land use changes, recreational shooting, poisoning, genetic drift, genetic isolation, and naturally occurring events (FWS, 2003).

References:

Dyni, E. and E. Yensen. 1996. Dietary similarity in sympatric Idaho and Columbian ground squirrels (*Spermophilus brunneus* and *Spermophilus columbianus*). Northwest Science. 70:99–108.

United States Department of the Interior. 2000. Fish and Wildlife Service. Endangered and threatened wildlife and plants; Determination of Threatened Status for the Northern Idaho Ground Squirrel. Federal Register, Vol. 65, p. 17786, April 5, 2000.

U.S. Fish and Wildlife Service. 2003. Recovery Plan for the Northern Idaho Ground Squirrel (*Spermophilus brunneus brunneus*). Portland, Oregon, 68 p.

Yensen, E., M.P. Luscher, and S. Boyden. 1991. Structure of burrows used by the Idaho ground squirrel, *Spermophilus brunneus.* Northwest Science. 65:93–100.

Yensen, E. and P.W. Sherman. 1997. *Spermophilus brunneus.* Mammalian Species. 560: 1–5.

Woodland Caribou, *Rangifer tarandus caribou*

Status: The woodland caribou was listed as an endangered species on January 14, 1983 (USDOI, FWS, 1983).

Pertinent Species Information: The woodland caribou is a brown hoofed mammal with large mossy antlers, and a hanging neck mane. Adult bulls weigh up to 270 kg but average about 180 kg. Cows average 115 kg. Both males and females grow antlers but cows' are shorter and have fewer points.

Most remain in forested habitats year-round. They migrate 80 km or more between their forested foothills winter range and alpine summer range. The woodland caribou's habitat consists of forested mountain regions and it prefers dense stands of fir and spruce. The woodland caribou's major food sources are arboreal lichens and they depend on them for up to six months of the year (FWS, 1993). They also eat huckleberry leaves, boxwood, and smooth woodrush during the spring and summer (FWS, 1993).

Caribou mate in early to mid-October. Calves are born by early June. Pregnant females move to typical spring habitat in April or May, then move back onto snow-covered areas often at higher elevations to calve (FWS, 1993). This behavior may function to avoid predators, thus increasing calf survival (Servheen and Lyon, 1989). A cow first calves at 3 years of age and will usually have one calf per year.

Historically, this species once populated most of the northern portion of the United States, ranging from New England to Washington. The only surviving populations in the United States are found in the Selkirk Mountain ecosystem of Idaho and Washington. All other populations within the lower 48 states have been extirpated.

Threats to the woodland caribou include logging, coal mining, and oil and gas exploration which have greatly reduced the woodland caribou's habitat. When large areas of old-growth coniferous forests are logged, moose, deer and elk populations increase. As their prey become more plentiful, more wolves move in. Woodland caribou are most vulnerable to wolves so they suffer the greatest losses.

References:

Servheen, G. and J. Lyon. 1989. Habitat use by woodland caribou in the Selkirk Mountains. J. Wildlife Management. 53:230–237.

United States Department of the Interior. 1983. Endangered and Threatened Wildlife and Plants: Emergency Determination of Endangered Status for the Population of Woodland Caribou Found in Washington, Idaho, and Southern British Columbia. Federal Register, Vol. 48, p. 1726, January 14, 1983.

U.S. Fish and Wildlife Service. 1993. Recovery Plan for Woodland Caribou in the Selkirk Mountains. Portland, OR. 71 pp.

Gray Wolf, *Canis lupus*

Status: The gray wolf has been designated as threatened in the western distinct population segment (CA, ID, MT, NV, OR, WA, WY, UT north of U.S. Highway 50, and CO north of Interstate Highway 70, except where listed as an experimental population).

Designation of a Northern Rocky Mountain Gray Wolf Distinct Population Segment (Montana, Wyoming, Idaho, eastern Washington, eastern Oregon, and north central Utah) has been proposed and this population has been proposed for delisting (USDOI, FWS, 2007).

Critical habitat was designated for this species on March 9, 1978 (USDOI, FWS, 1978) but does not occur in the program area.

Pertinent Species Information: The gray wolf is a member of the *Canidae* family and resembles a large dog, but differs in having relatively longer legs, larger feet, and narrower chest. Wolves also have tails that are straight rather than curved upward posteriorly like those of dogs. Total length is about 51 to 71 inches, and weight is above 44 to 176 pounds for males.

Wolves live in groups or packs, consisting generally of two to eight members (FWS, 1992). Packs are primarily family groups, consisting of a breeding pair, their pups from the current year, offspring from the previous year, an occasionally, an unrelated wolf. Packs defend a territory of 20 to 214 square miles.

Wolves gain sexual maturity in their second year, but often do not breed until the third. It is believed that wolves mate for life. The mating season may be any time between January and April depending upon locale. The gestation period is 63 days with an average of four to six pups (range of 1 to 11). Dens are usually in a sheltered place in a hole, rock crevice, or hollow log.

Unlike most mammals, wolves do not construct or make use of shelters, except for dens used to give birth and rear young for about 2 months. Seasonal activity can be categorized into limited wanderings during the rest of the year (40 miles or more a day). Wolves prey on large mammals primarily--white-tailed and mule deer, caribou, moose, Dall sheep, bighorn sheep, and beaver. Only rarely are rodents and birds consumed. Wolves spend almost all of their waking time eating or hunting in packs, usually fewer than eight members.

Gray wolves do not seem particular about habitat. They originally occurred in arctic tundra, taiga, plains or steppes, savannahs, and hardwood, softwood, and mixed forests (Chapman and Feldhamer, 1982).

Reasons for decline include negative attitudes towards wolves by humans, leading to poisoning, trapping, shooting, and State and Federal bounties resulted in extirpation of this species from more than 95 percent of its range in the 48 coterminous states to scattered populations in northern Minnesota and the northern Rocky Mountains.

References:

Chapman, J. A. and Feldhamer, G. [eds.]. 1982. Wild mammals of North America. Baltimore, MD: The Johns Hopkins University Press. 1147 p.

United States Department of the Interior. 1967. Endangered Species List - 1967. Federal Register, Vol. 32, p. 4001, March 11, 1967.

United States Department of the Interior. 1978. Endangered and Threatened Wildlife and Plants; Reclassification of the Gray Wolf in the United States and Mexico, With Determination of Critical Habitat in Michigan and Minnesota. Federal Register, Vol. 43, p. 9607, March 9, 1978.

U.S. Fish and Wildlife Service. 1992. Recovery Plan for the Eastern Timber Wolf. Twin Cities, MN. 73 pp.

United States Department of the Interior. 2003. Endangered and Threatened Wildlife and Plants; Final Rule To Reclassify and Remove the Gray Wolf From the List of Endangered and Threatened Wildlife in Portions of the Conterminous United States; Establishment of Two Special Regulations for Threatened Gray Wolves. Federal Register, Vol. 68, p. 15803, April 1, 2003.

United States Department of the Interior. 2007. Endangered and Threatened Wildlife and Plants; Designating the Northern Rocky Mountain Population of Gray Wolf as a Distinct Population Segment and Removing This Distinct Population Segment From the Federal List of Endangered and Threatened Wildlife; Proposed Rule. Federal Register, Vol. 72, p.6105-6139, February 8, 2007

Pygmy Rabbit (Columbian Basin Distinct Population Unit), *Brachylagus idahoensis*

Status: The pygmy rabbit (Columbian Basin Distinct Population Unit) was listed as an endangered species on November 30, 2001 (USDOI, FWS, 2001).

Pertinent Species Information: The smallest rabbit species in North America, the pygmy rabbit measures 9.2-11.6 inches (23.5-29.5 cm) in length, weighs a slight 0.88-1.02 lbs (398-462 g). The pygmy rabbit is typically colored brown/slate gray with short, white-margined, ears and a small tail.

The breeding season of pygmy rabbits lasts from March through May in Idaho; in Utah, it lasts from February through March (Chapman and Feldhamer, 1982). The gestation period of pygmy rabbits is unknown. An average of six young are born perlitter and a maximum of three litters are produced per year (Green and Flinders, 1980).

Big sagebrush is the primary food source, but grasses and forbs are eaten in mid- to late summer (Green and Flinders, 1980; Lyman, 1991). Pygmy rabbits may be active at any time of day; however, they are generally most active at dusk and dawn. They usually rest near or inside their burrows during midday (Green and Flinders, 1980). Pygmy rabbits are generally limited to areas on deep soils with tall, dense sagebrush which they use for cover and food (Flath, 1994; Green and Flinders, 1980). Individual sagebrush plants in areas inhabited by pygmy rabbits are often 6 feet or more in height (Flath, 1994). Extensive, well-used runways interlace the sage thickets and provide travel and escape routes (Green and Flinders, 1980).

The pygmy rabbit is the only native leporid that digs burrows. Juveniles use burrows more than other age groups. Early reproductive activities of adults may be concentrated at burrows (Green and Flinders, 1980). Burrows are usually located on slopes at the base of sagebrush plants, and face north to east. Tunnels widen below the surface, forming chambers, and extend to a maximum depth of about 3.3 feet.

A distinct population segment of the pygmy rabbit is found only in one area of Washington, Sagebrush Flat, and is nearly extinct. It has declined greatly in eastern Washington, from six colonies to probably just one, and from at least 150 individuals to fewer than 30 in the last decade (USDOI, FWS, 2001, 2003). Recently the Washington Department of Fish and Wildlife has initiated a captive-breeding program with hopes of revitalizing the population. Originally planning on crossbreeding with Idaho pygmies, the idea was scrapped in favor of preserving the Washington sub-species when it was found the two are genetically different (Pacific Diversity Institute, 2004).

The loss of habitat is probably the most significant factor contributing to pygmy rabbit population declines.

References:

Chapman, J. A. and Feldhamer, G. [eds.]. 1982. Wild mammals of North America. Baltimore, MD: The Johns Hopkins University Press. 1147 p.

Flath, D. 1994. Bunnies by the bunch. Montana Outdoors. 25(3):8-13.

Green, J. S. and J. T. Flinders. 1980. BRACHYLAGUS IDAHOENSIS. Mammalian Species. 125:1-4.

Lyman, R. L. 1991. Late Quaternary biogeography of the pygmy rabbit (BRACHYLAGUS IDAHOENSIS) in eastern Washington. J. Mamm. 72:110-117.

Pacific Biodiversity Institute, Endangered Species Information Network. Pygmy Rabbit. <www.pacificbio.org/ESIN/Mammals/PygmyRabbit/pygmyrabbit.html> last accessed September 8, 2004.

United States Department of the Interior. 2001. Fish and Wildlife Service. Endangered and threatened wildlife and plants. Emergency Rule To List the Columbia Basin Distinct Population Segment of the Pygmy Rabbit (*Brachylagus idahoensis*) as Endangered. Federal Register, Vol. 66, p. 59749, November 30, 2001.

United States Department of the Interior. 2003. Fish and Wildlife Service. Endangered and threatened wildlife and plants; final rule to list the Columbia Basin Distinct Population Segment of the Pygmy Rabbit (*Brachylagus idahoensis*) as endangered. Federal Register, Vol. 68, p. 10409, March 5, 2003.

Program Assessment for Species that Could be Struck by Trucks or Trains: APHIS has determined that transport of GRG from Hawaii via rail or truck may affect, but is not likely to adversely affect the Columbian white-tailed deer (Columbia River DPS), Canada lynx, grizzly bear, northern Idaho ground squirrel,woodland caribou, gray wolf, and pygmy rabbit (Columbian Basin Distinct Population Unit) for the following reasons:

- Only currently established routes will be used. No new railways or roads will be constructed.

- No spillage of garbage is likely –the chance of an accident is low, and bales are tied down to the trucks and/or railcars. If a spill were to occur, very low amounts of greenwaste (< 3 percent) are in the bales and will not attract bears or other animals to forage and be struck by trains or trucks.

- There will be only a slight increase in rail or truck traffic as a result of the proposed action. Rail traffic is expected to increase by only less than 1 percent in Oregon and Washington, and by 3 percent in Idaho. These estimates of rail increase are very conservative and assume that all of the GRG from Hawaii would be transported by rail, a scenerio that is unlikely. Truck/highway transport of freight would increase by only 0.2, 0.1, and 0.5 percent in Oregon, Washington, and Idaho, respectively. Again, this assumes that all GRG would be transported by truck to landfills.

Discussion of Remaining Species and Designated Critical Habitat That Occur in Washington, Oregon, and Idaho.

If plant pests from Hawaii were to escape and establish in the environments of Washington, Oregon, and Idaho, some of these might attack federally-listed plants. However, APHIS has determined that there will be no effect on the following plant species (table 3) or designated critical habitat of the Wenatchee Mountains checkermallow because of the negligible risk of pest escape and establishment of Hawaiian plant pests in Washington, Oregon, and Idaho, as described previously in this document and determined in the APHIS risk assessments (see appendices C-F).

Table 3. Listed Plants in Idaho, Oregon, and Washington.

Common Name	**Scientific Name**	**State of Occurrence**	**Listing Status**	**Critical Habitat?**
Applegate's milk-vetch	*Astragalus applegatei*	OR	E	No
Bradshaw's desert parsley	*Lomatium bradshawii*	WA, OR	E	No
Cook's lomatium	*Lomatium cookii*	OR	E	No
Gentner's fritillary	*Fritillaria gentneri*	OR	E	No
Golden paintbrush	*Castilleja levisecta*	WA	T	No
Kincaid's lupine	*Lupinus sulphureus* ssp. *kincaidii*	WA, OR	T	No
Large-flowered woolly meadowfoam	*Limnanthes floccosa* ssp. *grandiflora*	OR	E	No
MacFarlane's four-o'clock	*Mirabilis macfarlanei*	ID, OR	T	No
Nelson's checkermallow	*Sidalcea nelsoniana*	WA, OR	T	No
Rough popcornflower	*Plagiobothrys hirtus*	OR	E	No
Showy stickseed	*Hackelia venusta*	WA	E	No
Spalding's catchfly	*Silene spaldingii*	ID, WA, OR	T	No
Ute ladies'tresses	*Spiranthes diluvialis*	ID, WA	T	No
Water howellia	*Howellia aquatilis*	ID, WA, OR	T	No
Wenatchee Mountains checkermallow	*Sidalcea oregana* var. *calva*	WA	E	Yes
Western lily	*Lillium occidentale*	OR	E	No
Willamette daisy	*Erigeron decumbens* var. *decumbens*	OR	E	No

Certain birds have been discussed previously in this BA because of the possibility of being struck by trucks or trains carrying baled GRG. However, APHIS has determined that the proposed action will have no effect on the following birds (table 4) or the critical habitat of the marbled murrelet because they would not occur in areas where they could be struck by trucks or trains carrying GRG.

Table 4. Listed Birds in Washington, Oregon, and Idaho not mentioned previously in this document.

Common Name	Scientific Name	State of Occurrence	Listing Status	Critical Habitat?
Brown pelican	*Pelecanus occidentalis*	WA, OR	E	No
Eskimo curlew	*Numenius borealis*	ID, OR	E (likely extinct)	No
Marbled murrelet	*Brachyramphus marmoratus*	WA, OR	T	Yes
Northern spotted owl	*Strix occidentalis caurina*	WA, OR	T	Yes
Short-tailed albatross	*Phoebastria albatrus*	WA	E	No

Fish species occurring in the mainstem Columbia River have been discussed previously in this document as potentially being affected by decreased water quality from oil/fuel spillage or GRG bales dropped and broken in the Columbia River at the barge unloading point. However, APHIS has determined that there will be no effect on the following aquatic species or their critical habitat (table 5) because they do not occur in the mainstem Columbia River where GRG bales would be barged.

Table 5 Listed aquatic species in Washington, Oregon, and Idaho but not occurring in the Columbia River.

Common Name	Scientific Name	State of Occurrence	Listing Status	Critical Habitat?
Banbury Springs limpet	*Lanx* sp.	ID	E	No
Bliss Rapids snail	*Taylorconcha serpenticola*	ID	T	No
Borax Lake chub	*Gila boraxobius*	OR	E	Yes
Bruneau hot springsnail	*Pyrgulopsis bruneauensis*	ID	E	No
Foskett speckled dace	*Rhinichthys osculus* ssp.	OR	T	No
Hood Canal summer-run chum salmon	*Oncorhynchus keta*	WA	T	Yes
Hutton tui chub	*Gila bicolor* ssp.	OR	T	No
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	OR	T	No
Lost River sucker	*Delistes luxatus*	OR	E	No
Oregon coast Coho salmon	*Oncorhynchus kisutch*	OR	T	Yes
Oregon chub	*Oregonichthys crameri*	OR	E	No
Ozette Lake sockeye salmon	*Oncorhynchus nerka*	WA	T	Yes
Puget Sound chinook salmon	*Oncorhynchus tshawytscha*	WA	T	Yes
Shortnose sucker	*Chamistes brevirostris*	OR	E	No
Snake River physa snail	*Physa natricina*	ID	E	No
Utah valvata snail	*Valvata utahensis*	ID	E	No
Vernal pool fairy shrimp	*Branchinecta lynchi*	OR	T	Yes
Warner sucker	*Catostomus warnerensis*	OR	T	Yes
White sturgeon, Kootenai River system	*Acipenser transmontanus*	ID	E	Yes

APHIS has determined that there would be no direct effects on the listed butterflies from the proposed action (table 6). In addition there would be no indirect effects caused by plant pests escaping and establishing in the environment to attack host plants of these species. Therefore APHIS has determined that the proposed action would have no effect on the Oregon silverspot and Fender’s blue butterflies or the critical habitat of the Oregon silverspot.

Table 6. Listed butterfly species occurring in Washington and Oregon (none are listed in Idaho).

Common Name	Scientific Name	State of Occurrence	Listing Status	Critical Habitat?
Fender's blue butterfly	*Icaricia icarioides fenderi*	OR	E	No
Oregon silverspot butterfly	*Speyeria zerene hippolyta*	WA, OR	T	Yes

Appendix A. Compliance Agreements

1. Example Compliance Agreement for Movement of GRG Bales From Hawaii

UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE **COMPLIANCE AGREEMENT**	According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0579-0054. The time required to complete this information collection is estimated to average 1.25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.
1. NAME AND ADDRESS OF PERSON OR FIRM **Hawaiian Waste Systems, LLC** **91-165 Kalaeloa Boulevard** **Kapolei, HI 96810**	2. LOCATION Kapolei, HI
3. REGULATED ARTICLE(S) **Garbage and Regulated (domestic) Garbage from Honolulu, Hawaii**	
4. APPLICABLE FEDERAL QUARANTINE(S) OR REGULATIONS 7 CFR 330.400, 7 CFR 318.13, 7 CFR 318.47, 7 CFR 318.30, 7 CFR 318.60, 9 CFR 94.5 ,	

5. PORTS OF COVERAGE:
Honolulu, Hawaii Areas (Covered by) USDA OFFICES IN: Honolulu.

6. I/We agree to the following:

General

This Compliance Agreement (CA) on Garbage and Regulated (domestic) Garbage Handling Procedures authorizes Hawaii Waste Systems, LLC (HWS) and its authorized representatives to handle and transport Garbage and Regulated (domestic) Garbage from Honolulu, Hawaii to the Roosevelt Regional Landfill, Washington, in accordance with the provisions of the applicable Federal Quarantines and the Administrator's approval and under the following conditions approved by the United States Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection and Quarantine (USDA, APHIS, PPQ). Specifically, this Compliance Agreement applies to the baling, wrapping, and handling of Garbage and Regulated (domestic) Garbage from the city and county of Honolulu, Hawaii. The bales are to be free of all agricultural waste and wrapped according to APHIS regulations. The bales are to be transported from Honolulu by barge to Roosevelt, Washington, and then buried without breaking and spreading waste in accordance with the regulations for solid waste disposal and all applicable Federal, State, and Local ordinances. All Foreign Garbage, not of Hawaii origin, is specifically prohibited from movement under this compliance agreement.

DEFINITIONS
Terms found in the agreement shall refer to the following:

Agricultural waste - Byproducts generated by the rearing of animals and the production and harvest of crops or trees. Animal waste, a large component of agricultural waste, includes (e.g.) feed waste, bedding and litter, and feedlot and paddock runoff from livestock, dairy, and other animal-related agricultural and farming practices.

Bale means the confined unit of Garbage and Regulated (domestic) Garbage that has been approved for transport and burial. Bales are formed meeting all APHIS requirements in 7CFR330.

Barge means the conveyance via ocean and the Columbia River on which the baled Garbage and Regulated (domestic) Garbage will be carried.

Collections of agricultural waste and yard waste refers to bulk collections/pick-up of waste which is made up of primarily agricultural waste and yard waste. All collections of agricultural and yard waste shall not be accepted.

Commingling means the mixing of any regulated and non-regulated materials (including incinerated ash) within the bales, at any staging or transport area.

Company Name – Hawaiian Waste Systems, LLC; (HWS)

Compression refers to the process in which the waste articles are crushed under high pressure, expelling air from, and compacting waste articles into a high density bale.

Foreign garbage means all materials, associated with fruits, vegetables, meats or animal products, that have been removed (in Hawaii) from any means of conveyance originating from a port outside the continental United States (including Alaska) or Canada, which has not been treated in accordance with 7 CFR part 330 for foreign pests and animal diseases. The disposal method described in this compliance agreement has not been evaluated for the risk of animal diseases.

Garbage is defined as urban (commercial and residential) solid waste from municipalities on any Hawaiian island.

HWS refers to **Hawaiian Waste Systems, LLC**, 91-165 Kalaeloa Boulevard, Kapolei, HI 96707. It is the location of the HWS Transfer Station operated by HWS

Inspector A properly identified employee of the USDA or other person authorized by the USDA to enforce the provisions of the Plant Protection Act and related legislation, quarantines, and regulations.

Offloading means to move bales from the means of conveyance to its final destination spot; the bales will not be placed on any other means of conveyance.

Patch is made of impermeable film made of low density polyethylene, of at least 16 micrometers thickness, that is coated on one side with a non-hardening mastic/adhesive.

The patch must be sufficient to establish an airtight seal.

Plant pest means any living stage of any insects, mites, nematodes, slugs, snails, protozoa, or other invertebrate animals, bacteria, fungi, other parasitic plants or reproductive parts thereof, viruses, noxious weeds, or any organisms similar to or allied with any of the foregoing, or any infectious substances which can directly or indirectly injure or cause disease or damage in any plants or parts thereof, or any processed, manufactured, or other products of plants.

PPQ Hawaii means the local office of the United States Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection and Quarantine (USDA, APHIS, PPQ), Port of Honolulu located at 3375 Koapaka Street, Honolulu, HI 96819, phone number, (808) 861-8446 and fax, (808) 861-8450.

PPQ Washington means an office of the USDA, APHIS, PPQ in Washington State; located at 222 N. Habana Street, Spokane, WA 99202, phone number, (509)353-2950 and fax, (509)353-2637.

Puncture - any hole which is found in the plastic of the bale which goes through all four layers of the wrapping.

Regulated Garbage refers to waste articles generated in Hawaii that are restricted from movement to the continental U.S. under various quarantine regulations established to prevent the spread of plant pests (including insects, disease, and weeds) into areas where the pests are not prevalent.

Roosevelt Regional Landfill refers to the landfill site located at 500 Roosevelt Grade Road, Roosevelt, Washington.

Rupture refers to a rupture or tear in the wrapping film where an observer or inspector is able to see Garbage and Regulated (domestic) Garbage that is no longer covered by film.

Shredding refers to the process used to reduce bulky articles into scraps.

Soil means the loose surface material of the earth in which plants grow, in most cases consisting of disintegrated rock with an admixture of organic material and soluble salts.

Staging Area refers to the defined area where bales with apparent air tight seals are held and monitored to ensure air tight integrity. The Staging Area is located at Barber's Point, Pier 5 at Barber's Point Deep Water Harbor located in Campbell Industrial Park, Kapolei, HI. Barber's Point shall be the site of the secondary Wrapping Area, the Storage Area, the Transport Area and the barge loading site (unless APHIS-approved alternative site is designated). Attached hereto is a site map illustration the location of Barber's Point and the operational sites as described herein.

Tear - any rupture found in the plastic of the bales which goes through all four layers of wrapping.

Transloading means the movement of regulated articles from one means of conveyance to any other means of conveyance.

Transport Area refers to the location where bales approved for movement onto the barge are positioned for loading. The transport area is located at Barber's Point, Pier 5 at Barber's Point Deep Water Harbor located in Campbell Industrial Park, Kapolei, HI.

Washington compliance agreement refers to the agreement between PPQ Washington and Hawaiian Waste Systems, LLC, 1011 SW Klickitat Way #C-109, Seattle, WA 98134.

Wrapping - The wrapping material shall be an impermeable film made of low density polyethylene, of at least 16 micrometers thickness, that is coated on one side with a non-hardening mastic/adhesive. Bales are mechanically wrapped to achieve an air tight seals.

Wrapping Area refers to the station where the bale wrapping machinery is located. The wrapping equipment should be located at each point where bales are handled. The two wrapping areas identified for this compliance agreement are: The initial wrapping area shall be located at HWS Transfer Station at 91-165 Kalaeloa Blvd., Kapolei, Oahu; and a wrapping area will be located at Barber's Point, Pier 5 at Barber's Point Deep Water Harbor located in Campbell Industrial Park, Kapolei, HI. The HWS Transfer Station is located approximately [2.5] miles from the Barber's Point Pier facility. Attached hereto is a map showing the relative locations of the two facilities and the proposed trucking route.

Yard waste – Solid waste composed predominantly of grass clippings, leaves, twigs, branches, and other garden refuse.

<u>Collection of Garbage and Regulated (domestic) Garbage for transport</u>

Garbage and Regulated (domestic) Garbage collected by refuse trucks shall be delivered to the HWS facility at HWS Transfer Station at 91-165 Kalaeloa Blvd., Kapolei, HI 96707. Trucks of agricultural waste and yard waste shall not be accepted. Waste materials, containers, and bins associated with Foreign Garbage are strictly prohibited and shall not be accepted. The ground surface of the all areas for handling the Garbage and Regulated (domestic) Garbage should be level, solid, and impervious surface of asphalt or cement.

The risk assessments for the movement of Garbage and Regulated (Domestic) Garbage were conducted based on the specific details provided by HWS. These details included the exclusion of incinerator ash and the removal of all hazardous and liquid waste prior to baling. HWS will notify PPQ if the company plans change to include such materials so that the proper risk assessments can be conducted.

<u>Preparation and Baling of Garbage and Regulated (domestic) Garbage for transport</u>

The following is a description of the Garbage and Regulated (domestic) Garbage waste handling and processing steps:

The waste transfer station will receive only household and commercial waste acceptable for disposal at Roosevelt Regional Landfill. Collection trucks will deliver waste picked up from existing collection routes. After waste is tipped onto the tipping floor it will be inspected for unacceptable waste including yard waste, (other than incidental amounts not to exceed 3% of the total waste stream pursuant to 7 CFR Part 330), agricultural waste, industrial waste, infectious waste, loads predominantly of construction and demolition waste and regulated hazardous waste. Any segregated unacceptable waste will be separated for further processing. Loads consisting predominately of construction and demolition (C&D) waste will be transferred to a C&D handling facility. Other waste will be drummed or otherwise contained and arrangements made for its proper transportation and disposal. Notwithstanding the foregoing, it is acknowledged and agreed that follow-up inspection of the route that was the source of the unacceptable waste will be conducted to try to locate the source and correct the waste handling process that allowed unacceptable waste to be collected.

Each load of waste received at the facility will be weighed and the date, time, company, driver name, truck number (i.e., company fleet number), weight (loaded), weight (empty), and origin of load, will be recorded. Records will be kept for a minimum of three years.

Step-by-step waste receiving and processing description is as follows:

1. Waste is delivered by collection truck to the HWS Transfer Station. The truck is weighed and then proceeds to the baling facility where it tips its waste onto the tipping floor. The collection truck is weighed again as it exits the site and continues on its collection routes. A weigh ticket is generated and kept on file.
2. A loader operator inspects the waste and segregates any non-household or non-commercial waste. Household and commercial waste is pushed onto the in-feed conveyor by the loader. Segregated waste is set aside and handled separately as described previously.
3. Garbage and Regulated (domestic) Garbage moves along the conveyor to the intake feed of the baler. The baler operator introduces waste into the baler where it is compressed using a compactor that produces bale densities of approximately 1000 kg per cubic meter for the most waste materials. The same force compaction will be used regardless of the material in the processing line. Companies will provide documentation of the equipment used and compactor specifications. The baler operator monitors the baler operation and replaces baling wire or strapping and makes other adjustments as needed.
4. The compacted bale moves from the baler via conveyor belt to the plastic wrapper. The plastic wrapper automatically wraps the bale with a minimum of 4 layers of pre-stretched, mastic-backed polyethylene plastic, of at least 16 micrometers thickness, and extrudes it onto a roller conveyor. The baler operator or loader operator will inspect each bale for integrity of the plastic wrap. Any bale with unsatisfactory wrapping will be re-sent through the wrapper.
5. The wrapped bale moves down the roller conveyor and is removed by a loader with a special attachment that picks up the bale by squeezing it between two hydraulically

operated smooth faced arms, or another piece of equipment designed to handle the bales without tearing or damaging them in any way. The smooth faced arms prevent damage to the plastic wrap.

6. The loader moves the bale onto the bale storage area - which has a solid, impervious (concrete or asphalt) surface that is kept free of soil or other contaminants -- or directly onto a flat bed truck, if one is available. The loader then returns to pick up another bale from the roller conveyor.
7. Bales that are placed onto the bale storage area will be loaded onto flat bed trucks as they become available.
8. Flat bed trucks will haul the bale to Barber's Point where they will be unloaded and stacked in the Staging Area. The same type of loader attachment (or equivalent equipment) will be used for unloading to prevent damage to the plastic wrap. The loader operator will inspect each bale for damage to the plastic wrap. If damage is found it will be returned to a wrapping area for rewrapping.
9. Bales cannot be loaded onto the barge until they have been staged for at least five days. After five days, the bales are considered ready for transport and the area will be designated the Transport Area. HWS will maintain a clear separation between those bales ready for transport and those bales in the staging process.
10. Bales at the Barbers Point Harbor facility will be stored until a barge is ready to be loaded. Barge loading will occur approximately monthly. When a barge is ready for loading, the bales in the Transport Area will be transferred onto the barge, again using squeeze-arm hydraulic equipment or other comparable, appropriate lifting equipment to prevent damage to the plastic wrap. The loading supervisor will inspect each bale once the bale is loaded onto the barge. Any damaged bale will be returned to the Transfer Station for rewrapping and restaging or be rewrapped and restaged on site at Barber's Point.
11. When the barge is fully loaded it will proceed to its destination at the Roosevelt Regional Landfill in Washington State.

The compression settings on the baler shall be 1,000 kg per per cubic meter or more.

Records indicating the size and weight of each bale shall be maintained.

Garbage and Regulated (domestic) Garbage which has fallen apart from an unwrapped compressed bale, or has been otherwise improperly compressed, shall be set aside for a subsequent compression cycle.

The unwrapped, compressed bales shall be bound with plastic or metal clamps, netting, or strapping devices to retain its shape.

Compressed bales that do not hold together shall be rejected and set aside for a subsequent compression cycle. Records of re-compressed bales shall be maintained by HWS and available for monitoring by PPQ.

Each compressed bale will be wrapped by HWS using a process approved by USDA, APHIS.

The wrapping process will follow the compliance agreement guidelines as outlined below:

> The compressed bale shall be physically isolated by an air tight barrier. The air tight barrier shall be built with multiple layers of highly tensile, impermeable film (made of low density polyethylene wrap, of at least 16 micrometers thickness, coated on one side with a non-hardening mastic/adhesive), covering all surfaces of the bale, and completely isolating the internal contents.
>
> To ensure a strong air tight barrier, a minimum four layers of wrap shall be used to isolate each bale.
>
> Machinery that repeatedly achieves the criteria required shall be used.

Machinery used for wrapping shall be programmed to dispense a standard amount (length) of polyethylene wrap, in each wrap cycle. The length of the wrap programmed into each cycle, shall be in excess of the amount needed to provide four layers of wrap around a bale of maximum handling size and meet the wrapping specifications as listed in the definitions of this compliance agreement.

HWS will examine each wrapped bale to ensure the air tight integrity and proper wrapping. Any bales that are punctured, ruptured, or torn will be re-wrapped by HWS.

HWS will ensure that all wrapped bales will not contact surfaces contaminated by Garbage and Regulated (domestic) Garbage or soil. Any bales which come in contact with contaminated surfaces will be either re-wrapped or cleaned, and removed of any outside debris.

<u>Maintaining records of bales produced</u>

HWS must maintain a log which records bale identification, date of baling, inspections done, any remedial measures (e.g., patches, rewrapping). A manifest for each bale produced shall be maintained by HWS for statistical and tracking purposes. Information recorded shall include**:**

> Bale identification number
>
> Date wrapped
>
> Weight of bale
>
> Size of bale
>
> Records of ruptures, punctures or tears to include the date, name of inspecting personnel, action taken and names of personnel completing action
>
> Dates of entry into the staging, transport, and barge controlled areas and the name of personnel responsible for inspecting and authorizing movement of the bale into

those areas

Barge information (name and voyage #)

Date of departure (Honolulu)

Date of arrival (Washington)

Inspection reports of the condition of the bale upon arrival its arrival at the Roosevelt Regional Landfill in WA and any subsequent patching or re-wrapping required.

The records must be maintained and be available upon request by USDA-APHIS-PPQ. To ensure compliance, PPQ officers will be permitted access to the firm's premises and relevant records without prior appointment. Records will be kept for a minimum of 3 years from the date the bale is shipped to the continental U.S.

Marking and Identification of Bales

The bales must be permanently marked with the words "REGULATED GARBAGE," printed in a contrasting color to the wrap. The size of the letters shall be 3 inches in height and easily visible and legible.

Manifest and tracking identification numbers required on each bale include the Bale Identification Number, the Date Wrapped, and the Date Placed in Staging Area. These marking must be in a contrasting color to both the wrap and the words "REGULATED GARBAGE."

Markings on all bales must be viewable without moving the bales or climbing on top bales by the USDA APHIS PPQ inspector and/or designated cooperators. If markings are not viewable as stated above, a HWS operator will need to move the bales for viewing.

Movement to the Designated Staging Area

Bales approved for movement to the staging area shall be trucked by HWS or its authorized representative to the designated Staging Area.

Bales shall be moved using machinery best designed for holding, lifting and supporting its load with minimum or no breakage.

Bales shall be inspected upon placement onto the truck. Trained HWS personnel shall ensure that punctured, ruptured, or torn bales and bales that are externally contaminated by garbage or soil are not forwarded.

Bales that are punctured, ruptured, or torn while being loaded onto the truck shall be removed from the truck and re-wrapped. The date of re-wrapping shall be indicated in the bale manifest as specified under "Marking and Identification of Bales."

Bales that have been rewrapped shall be returned to the staging area for a minimum of 5 days. The date of placement in the Staging Area shall be indicated on the bale manifest.

Staging Area Operation Requirements

A wrapping machine which meets all approved wrapping technology shall be located at the HWS Transfer Station within [2.5] miles of Barber's Point. If wrapping machinery is located at the Staging area, HWS will ensure that the wrapping machinery located at the Staging Area shall be programmed to dispense a standard amount (length) of polyethylene wrap in each cycle. The length of the wrap programmed into each cycle shall be in excess of the amount needed to provide four layers of wrap around a bale of maximum handling size.

HWS will ensure that the Staging Area be kept clean and free of loose garbage and soil. The Staging Area shall be clearly marked and physically separated from the Transport Area. Operational procedures pertinent to the Staging and Transport areas shall be posted in a location visible to all HWS personnel and authorized representatives.

HWS shall develop and enforce plans for pest exclusion and eradication programs to control pests that may be attracted to the bales in the staging and loading area (i.e. rodents, birds, mollusks, etc.) These plans shall be submitted for approval by USDA, APHIS, PPQ in Honolulu, Hawaii.

Movement into the Staging Area

Bales with air tight integrity shall be forwarded to the staging area. The date of placement into the staging area shall be indicated in the bale manifest.

The bales shall be off loaded from the truck using machinery best designed for holding, lifting and supporting its load with minimum or no breakage.

Bales shall be inspected for punctures, ruptures and tears and external contaminants (i.e. garbage, soil or mollusks). Records of dates and identification of the personnel responsible for the inspection shall be indicated in the bale manifest.

Bales shall be grouped together by their projected lapse date in the staging area. Physical separations shall be used to differentiate these groups and signage indicating such separation shall be posted in a position visible to all personnel.

Bales shall be retained in the staging area for a minimum of 5 days.

Bales that have been punctured, ruptured, or torn enroute to the (staging area) site shall be marked with colored tape and set aside for re-wrapping and returned to a wrapping area. The date of re-wrapping shall be indicated in the bale manifest and on the outside of the bale as indicated in the "Marking and Identification" section of this agreement.

Bales that have been rewrapped shall be returned to the staging area for a minimum of 5 days. The date of placement in the Staging Area shall be indicated on the bale manifest.

After the minimum 5 day hold, bales shall be inspected for punctures, ruptures and tears and external contaminants. Date and identification of personnel responsible for inspection shall be indicated in the bale manifest.

Transport Area Operation Requirements

HSW will ensure that the Transport Area be kept clean and free of loose Garbage and Regulated (domestic) Garbage and soil. The Transport Area shall be clearly marked and physically separated from the Staging Area. Operational procedures pertinent to the Staging and Transport areas shall be posted in a location visible to all HWS personnel and authorized representatives.

HSW shall develop and enforce plans for pest exclusion and eradication programs to control pests that may be attracted to the bales in the staging and loading area (i.e. rodents, birds, mollusks, etc.) These plans shall be submitted for approval by USDA, APHIS, PPQ in Honolulu, Hawaii.

Movement into the Transport Area

Bales with air tight integrity are allowed movement to the designated transport area. Date and identification of personnel responsible for authorization of the movement shall be indicated in the bale manifest.

Any movement of bales shall be forwarded with machinery best designed for holding, lifting and supporting its load with minimum or no breakage.

Bales moved to the transport area, shall be inspected for punctures, ruptures, and tears upon placement. Date of placement in the transport area and the identification of the personnel responsible for the inspection shall be indicated in the bale manifest.

HWS will manage the placement of bales, such that the handling of bales will be minimized. HWS will track bales placement and date, such that all bales completing the 5-day staging requirement prior to a scheduled barge loading are maintained in a readily identified area. These bales shall be separated from bales that will not meet the 5-day staging requirement by the scheduled barge loading date. In this manner, the bales are not physically moved from the Staging Area to the Transport Area, but rather the bales achieving the minimum 5-day staging criteria are then designated to be within the Transport Area. The date of designation and the person authorizing the designation shall be indicated in the bale manifest

For example, if the barge is scheduled for loading beginning on August 1st, then only those bales staged on or before July 26th will be eligible for loading. HWS will maintain physically separate areas for those bales stacked on or before July 26th from those stacked on July 27th or after. The bales in the area stacked on or before July 26th will have transitioned into the Transport Area and are eligible for loading onto the barge. The bales stacked on July 27th or after will be eligible for loading onto the next barge arriving in approximately one month.

Bales found punctured, ruptured, or torn shall be immediately marked with colored tape and removed from the transport area for rewrapping.

Bales with contaminants on the outside of the bale (e.g. soil, debris, pests, etc) shall be immediately cleaned or removed from the transport area.

Re-wrapped bales shall be moved back into the staging area for a minimum 5 day holding period. The date of re-wrapping and placement into the Staging area shall be indicated in the bale manifest and on the outside of the bale as indicated in the "Marking and Identification" section of this agreement.

Bales held for more than 75 days shall be re-wrapped. The date of re-wrapping and placement into the Staging area shall be indicated in the bale manifest and on the outside of the bale as indicated in the "Markings and Identification" section of this agreement.

Bales in the transport area which have met the requirements for the transport to the mainland are authorized for movement onto the barge and shall be forwarded by machinery best designed for holding, lifting and supporting its load with minimum or no breakage.

The bales must be permanently marked as specified in the "Markings and Identification" section on this agreement.

Markings on all bales must be viewable without moving the bales or climbing on top bales by the USDA APHIS PPQ inspector and/or designated cooperators. If markings are not viewable as stated above, a HWS operator will need to move the bales for viewing.

Movement onto the Barge

HWS personnel or their authorized representative shall conduct a full inspection of each bale upon placement onto the barge. Bales shall be inspected for any punctures, ruptures, or tears and external contaminants (i.e. soil, garbage, mollusks) upon placement onto the barge. The date and identification of the personnel responsible for the inspection and authorization for forward movement shall be indicated in the bale manifest.

Barge information (Name and Voyage no.) and Date of departure from Honolulu shall be indicated on the bale manifest.

Any bale found punctured, ruptured, or torn before the barge leaves the port shall be immediately marked with colored tape and removed from the barge for re-wrapping. Re-wrapped bales shall be moved back into the staging area for a minimum 5 day holding period.

The date of re-wrapping and placement into the Staging area shall be indicated in the bale manifest and on the outside of the bale as indicated in the “Marking and Identification” section of this agreement.

Any other material (regulated or non-regulated, such as non-rolling equipment, empty containers, and non-regulated recyclables) placed on the same barge as the bales of Garbage and Regulated (domestic) Garbage must be secured to the barge in such a manner that they will not move or come in contact with the wrapped bales. Any other material placed on the same barge must be separated from the bales of Garbage and Regulated (domestic) Garbage approved for movement under this compliance agreement and must be easily distinguishable from the bales of Garbage and Regulated (domestic) Garbage approved for movement under this compliance agreement.

CLEANUP PROCEDURES FOR GARBAGE AND REGULATED (DOMESTIC) GARBAGE SPILLS AND EQUIPMENT

HWS must provide personnel and appropriate measures to control the Garbage and Regulated (domestic) Garbage in the event of a spill or other emergency. HWS will follow the clean-up protocols specified for spills as outlined in Appendix 1 of this compliance agreement. Any changes to these protocols must be reviewed and approved by USDA, APHIS, PPQ, and all appropriate Federal, State and Local regulations.

A contingency plan should be in place to handle any spills or breakage during any part of the voyage, transloading, offloading, and/or transportation of the bales. All company employees, designees, drivers, and handlers of the baled Garbage and Regulated (domestic) Garbage shall be informed of the contingency plan.

APPENDIX 1 clean up protocols will be followed. APPENDIX 1 is attached to this document.

If spillage occurs during transport, USDA, APHIS, PPQ must be notified immediately. See list of contact numbers provided below:

<u>Contact Numbers</u>

Compliance Officer	Honolulu, HI	808-861-8446
Supervisory Compliance Officer	Honolulu, HI	808-861-8465
For after hour, seven days a week		
Operations Desk	Honolulu, HI	808-861-8490

<u>PPQ CLEARANCE IN HONOLULU</u>

USDA, APHIS, PPQ in Honolulu, Hawaii shall be notified by facsimile 48 hours in advance of the departure date for each shipment of baled Garbage and Regulated (domestic) Garbage destined to Washington. The notification shall include:

Barge name and Voyage no.

Date of departure from Honolulu

First U.S. mainland port of entry

Estimated date of arrival at the first U.S. mainland port of entry

Name and phone number of the contact personnel responsible for the shipment.

A list of the identification numbers for all bales included in the shipment.

HWS personnel are responsible for notifying PPQ by facsimile 48 hours in advance of the barge departure. PPQ may schedule or conduct a compliance inspection prior to departure of the barge.

Movement of the bales of Garbage and Regulated (domestic) Garbage is authorized only to the state of Washington through the Roosevelt Seaport. The tug/barge shall not be diverted to any other seaport.

Bales must remain on the same barge from the port of Honolulu to the authorized port. Transloading to any other barge or means of conveyance prior to arrival at the authorized U.S. mainland port of entry is prohibited.

Before leaving Hawaii, all bales must be well secured on the barge and within the railing to prevent falling during the voyage.

TRAINING

HWS shall present a training program to employees before they are permitted to handle and transport or supervise the handling and transport of Garbage and Regulated (domestic) Garbage. This training program should be at least one (1) hour in duration. Previously trained employees shall be provided review training annually. A record of employees and their training dates shall be maintained and available for PPQ review.

The training package must be approved by the local PPQ officer in charge, and may include both formal classroom training and on-the-job training. It must contain the following topics:

Procedures for maintaining control of Garbage and Regulated (domestic) Garbage

Define “Garbage” and “Regulated (domestic) Garbage” and “Foreign Garbage”

Explain the regulation and its purpose.

Explain the compliance agreement and its purpose.

Include film, slides, or other training aids on Hawaiian soil, plant diseases and pests

Specifically outline, by demonstration, illustration, or picture, proper regulated garbage handling procedures and transport

Explain the manifesting process

Be presented in English and other appropriate languages.

Procedures for reporting and data; procedures and reporting results of inspection of bales

Procedures for cleaning and disinfecting contaminated equipment and areas.

Records of training administered to employees shall be made available to PPQ personnel upon request.

RECORDS AND MONITORING (INSPECTIONS)

HWS must maintain a log which records all information as specified in the "Maintaining records of bales produced" section of this compliance agreement. This includes bale identification, date of baling, inspections completed and any remedial measures performed (e.g., patches, rewrapping).

These records must be kept for a minimum of 3 years from the date that the bale was shipped to the continental U.S.

To ensure compliance, USDA, APHIS, PPQ personnel shall be allowed to monitor operations during normal business hours without prior notification. HWS shall ensure a safe location is available for the inspector to conduct all aspects of the inspection. Safe viewing areas will be established as approved by PPQ Hawaii. This may be a stanchioned area near, but not directly in the path of the barge loading operators. The handling equipment shall allow tilting of the bale or offer some other method of inspection for the bottom of the bale without requiring the PPQ inspector to stand underneath or within the drop line of a machine-held bale.

Inspectors shall be allowed to safely view any unwrapped bales at the time of inspection.

The compression process and the scale station and readouts shall be visible to the inspector from a safe location.

The wrapping procedure and wrapping readouts showing calibration shall be visible to the inspector from a safe location.

Records of all bales shall be maintained and made available to inspectors during business hours.

ENVIRONMENTAL PROTECTION AND OTHER REGULATORY AGENCIES

By signing this agreement, the signer certifies that his/her facility has met or will meet the requirements of all applicable environmental and any other applicable regulatory authorities in addition to the Garbage and Regulated (domestic) Garbage handling regulated by the Animal and Plant Health Inspection Service.

ENDANGERED SPECIES ACT COMPLIANCE

For the barging of Garbage and Regulated (domestic) Garbage bales from Honolulu, Hawaii to the continental United States (mouth of the Columbia River), the following protection measures will be adhered to for the Steller sea-lion and Humpback whale. This is required for compliance with the Endangered Species Act:

Steller sea-lion
No barge will approach within 3 nautical miles of the steller sea lion rookeries in Oregon (Rogue Reef: Pyramid Rock and Orford Reef: Long Brown Rock and Seal Rock) and California (Ano Nuevo l., Southeast Farallon 1., Sugarloaf l. and Cape Mendocino).

Humpback whale
Within 200 nautical miles of the Hawaiian Islands, the barge will not approach or cause an object to approach within 100 yards of any humpback whale and the speed of the vessel will not exceed 13 knots.

NOTIFICATION

PPQ shall be notified within 7 days of any change in business status, business operations, telephone number, business address, management, ownership or business dissolution.

COMPLIANCE

This compliance agreement is only valid in conjunction with a valid Washington compliance agreement issued to HWS, for handling Garbage and Regulated (domestic) Garbage from Hawaii destined to the Roosevelt Regional Landfill.

This compliance agreement is nontransferable. If the person identified in section 7 of PPQ Form 519 leaves their present employer, HWS or position, then he/she must notify the local PPQ office immediately. This agreement will then be terminated.

If Garbage and Regulated (domestic) Garbage is handled by other personnel within the HWS, those persons must be under the permittee's supervision and must be aware of and able to adhere to all stipulations in this agreement.

This compliance agreement may be amended as necessary by USDA, APHIS, PPQ. HWS will be notified of all amendments.

NOTE: "Any person who knowingly violates the Plant Protection Act (PPA) (7 U.S.C. §§ 7701 et. Seq.) And/or the Animal Health Protection Act (AHPA) (7 U.S.C. §§ 8301 et. Seq.) may be criminally prosecuted and found guilty of a misdemeanor which can result in penalties, and one year prison term, or both. Additionally, any person violating the PPA and/or the AHPA may be assessed civil penalties of up to $250,000 per violation or twice the gross gain or gross loss for any violation that results in the person deriving pecuniary gain or causing pecuniary loss to another, whichever is greater."

WITHDRAWAL OF COMPLIANCE AGREEMENT

This compliance agreement may be canceled, by a PPQ Officer orally or in writing, if such officer determines that the holder thereof has not complied with any of the conditions stated in this compliance agreement. If the cancellation is oral, the cancellation and the reasons for the cancellation will be confirmed in writing as promptly as circumstances allow. Any person whose compliance agreement has been canceled may appeal the decision in writing to USDA- APHIS-PPQ within ten (10) days after receiving the written notification of the withdrawal. The appeal must be directed to the State Plant Health Director of Hawaii. The appeal must state all of the facts and reasons upon which the person relies to show that the compliance agreement was wrongfully canceled. USDA-APHIS-PPQ shall grant or deny the appeal, in writing, stating the reasons for such decision, as promptly as circumstances allow. If there is a conflict as to any material fact, a hearing shall be held to resolve such conflict. Rules of practice concerning such a hearing will be adopted by USDA-APHIS-PPQ.

Agreement

By signing this agreement, the primary holder of Hawaiian Waste Systems, LLC agrees to maintain the scope and intention of this compliance agreement. The signature further certifies that the listed business has met or will meet the requirements of all other applicable environmental authorities prior to the processing of any USDA regulated garbage.

This agreement may be immediately canceled or revoked for noncompliance.

I have read and understand the conditions of this compliance agreement.

<table>
<tr><td>6.Signature
□</td><td colspan="2">7. Title</td><td>8. Date Signed</td></tr>
<tr><td colspan="4">The affixing of the signatures below will validate this agreement, which shall remain in effect until canceled, but may be revised as necessary or revoked for noncompliance.</td></tr>
<tr><td colspan="2">10. Date of Agreement</td><td colspan="2">11. Agreement Number</td></tr>
<tr><td colspan="2">PPQ OFFICIAL (Name and Title)</td><td colspan="2">ADDRESS</td></tr>
</table>

Signature	

PPQ FORM 519
(FEB 2002)

COMPLIANCE AGREEMENT

APPENDIX 1 - Spill Response Plan for Hawaiian Waste Systems, LLC

HWS Emergency Response Planning

HWS shall, either directly or through its contracted service providers, at all times have emergency response procedures in place at all times while shipment of baled, wrapped Hawaiian waste is occurring.

HWS has contracted with Brusco Tug and Barge (Brusco) for the transport of baled and wrapped MSW from Oahu to the Roosevelt Intermodal Facility. As a marine carrier with over 35 years of tug and barge experience throughout the West coast and Hawaii, Brusco has longstanding internal response plans in place and in addition, Brusco is and shall remain under contract with MSRC Corporation and the Cowlitz County Clean Sweep. A copy of the MSRC contract is attached.

HWS has contracted with Regional Disposal Company (RDC, a wholly owned subsidiary of Allied Waste, Inc.) for the handling, transportation and disposal of the bales, such contract commencing at the Roosevelt Intermodal and includes acceptance of the bales on RDC trucks, transport of the bales to the Landfill, offloading of the bales at the Landfill and disposal of the bales at the Landfill. RDC, with over fifteen years of operational experience and over 30 million tons disposed of to date, has long standing emergency response plans (ERPs) in place. A copy of the standard form RDC ERP, amended to address the specifics of baled Hawaiian waste handling, is attached.

In brief, spills will be addressed as follows:

- **On Oahu**: If a bale ruptures or there is a spill in transit to the barge facility or in loading, such bale and any loose waste shall be loaded into a roll-off container and returned to the Campbell park baling/wrapping facility for re-processing. Any affected spillage site shall be cleaned so as to restore the affected site to its pre-spill state.
- **In marine transit**: If a bale is dislodged from the barge, Brusco shall report such incident as promptly as practicable and using either Brusco equipment (available for mobilization from its Longview facilities) or contracted equipment shall locate and retrieve such bale as practicable using a crane or other appropriate equipment. If a bale is ruptured as a result of being dislodged from the barge or being recovered, 6-mil hazardous waste bags will be available on the barge, which will be used to contain the ruptured bale in a manner similar to the “burrito” style burst bale protocol as described in the Compliance Agreement. The sealed bag will be delivered to the Roosevelt dock for offloading, transport to and disposal in the Landfill.
- **In Klickitat County**: Any bales that significantly rupture or are ‘spilled’ during off-loading shall be handled in accordance with the burst bale protocol provided for in the Compliance Agreement. In transit from the Roosevelt Intermodal to the Landfill, any spill shall be handled in accordance with RDC’s existing spill protocols – which entail a prompt

response, clean up of the affected area, and burial of the spilled material in the Landfill. Such spill response is laid out in greater detail in the attached RDC ERP.

WASTE SPILL PROTOCOL ON LAND

REGIONAL DISPOSAL COMPANY
(RDC)

EMERGENCY RESPONSE PLAN (ERP)

TRANSPORT OF BALED AND WRAPPED
HAWAIIAN MUNICIPAL SOLID WASTE
FROM THE ROOSEVELT DOCK
TO ROOSEVELT LANDFILL

Prepared by

Regional Disposal Company (RDC)

June 2006

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List of Tables

FOR 24-HOUR EMERGENCY RESPONSE CALL

Primary Number: (800) 275-5641
or
Secondary Number: (206) 332-7700

COMPLIANCE AGREEMENT

1.0 INTRODUCTION AND PURPOSE

The purpose of the Emergency Response Plan (ERP) is to outline emergency response procedures and establish a notification schedule for responding to emergencies involving the handling, transport, and disposal of Baled and Wrapped Municipal Solid Waste from Hawaii ("Hawaiian Waste") by the Regional Disposal Company (RDC). The primary facilities for handling, transport, and disposal of waste include the dock facility at the Roosevelt Intermodal ("Dock") and the Roosevelt Regional Landfill. RDC will transport the waste from the Dock to the Roosevelt Regional Landfill.

1.1 Emergency Response Team (ERTeam) Scope

The RDC Emergency Response Team (the ERTeam) will respond to any emergency involving Hawaiian Waste from Hawaii, once offloaded from marine-based equipment, during its transport to and disposal at the Roosevelt Regional Landfill.

1.2 Objective

RDC will maintain a team of emergency response personnel, under the direction of an Emergency Response Coordinator (the ERCoordinator) and Emergency Response Leader (ERLeader), trained and equipped to respond to any emergency involving Hawaiian Waste en route from the Dock to the Roosevelt Regional Landfill.

2.0 EMERGENCY RESPONSE PROCEDURES AND NOTIFICATION SCHEDULE

This section discusses the following: ERTeam duties and responsibilities; emergency response notification procedures; the Emergency Response Plan (ERP); transportation procedures; public relations; and post-emergency procedures.

2.1 ERTeam Duties And Responsibilities

The ERTeam includes an ERCoordinator, ERLeader, and ERTeam Members. In an emergency, the ERCoordinator will be located at the Roosevelt Regional Landfill site office, and the ERLeader will assemble the ERTeam Members and accompany them to the scene of the emergency, if an off-site response is necessary. Duties and responsibilities of the ERCoordinator, ERLeader and ERTeam

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Members are described in this section.

2.1.1 ERCoordinator

Preparedness

- Maintain written, detailed, up-to-date emergency response procedures
- Be experienced and knowledgeable in emergency response procedures, and on-call and available on a 24-hour basis
- Be thoroughly acquainted with the properties and general characteristics of RDC's primary transport and disposal system for Hawaiian Waste
- Maintain list of locations and contacts for outside resources
- Keep record of training received by each ERTeam Member
- Be prepared to respond to questions from the news media about emergency situations, if necessary
- Serve as ERLeader, if necessary

Response

- Coordinate response planning with ERLeader
- Arrange transportation for ERTeam to scene of emergency
- Communicate with caller to give additional advice and notify that ERTeam is responding
- Contact regulatory agencies, as necessary
- Maintain frequent communication with ERTeam at scene
- Arrange for additional personnel and supplies at the scene, if necessary
- Update RDC contacts regularly on status of emergency
- Arrange for relief ERTeam Members, as needed

2.1.2 ERLeader

Preparedness

- Maintain emergency equipment in operable condition at all times
- Ensure availability of sufficient number of ERTeam Members
- Be experienced and knowledgeable in emergency response procedures, and on-call and available on a 24-hour basis
- Participate in exercises at least annually to demonstrate emergency preparedness
- Evaluate and update equipment at least yearly
- Serve as ERCoordinator, if necessary

Response

- Coordinate assembly of ERTeam Members and equipment
- Maintain contact with person or official in charge at scene
- Consult and work under the direction of the person in charge at scene
- Direct ERTeam in on-site activities
- Communicate frequently with ERCoordinator for advice and, if necessary, assistance in obtaining additional equipment
- Monitor the health and safety of ERTeam Members
- Ensure equipment is cleaned and stored after emergency
- Complete post-emergency critique and Emergency Response Report

2.1.3 ERTeam Members

Preparedness

- Train and practice on emergency response equipment
- Serve as ERLeader, if necessary

Response

- Work under direction of ERLeader at scene
- Work in a safe, efficient manner
- Ask for help from ERLeader, if necessary

2.2 Emergency Response Notification

Because RDC's handling of Hawaiian Waste will commence after offloading from marine-based equipment, such handling will occur almost exclusively on RDC-controlled property. The exception to this will be transportation on Roosevelt Grade Road and the crossing of WA SR14. The ERTeam will likely receive notification of an emergency from RDC personnel, but may receive notification of an emergency, generally by telephone, from several sources including outside customers or facilities, government agencies, or other interested parties. The person receiving the call (the Contact), who may or may not be a member of the ERTeam, will get as much information as possible from the caller, using the Call Report (contained in Appendix 3.1) to record the information. The Contact will transfer the information to the ERCoordinator, or ERTeam Member on-call (see Figure 1), which will initiate the ERTeam Emergency Response Plan (ERP).

2.3 Emergency Response Plan

Upon receiving a call from the Contact regarding an emergency call received, the ERCoordinator will determine the type of response that is necessary.

2.3.1 Criteria and Circumstances for Implementing ERP

Based on an immediate initial assessment, the ERCoordinator will use his or her best judgment to determine when to initiate the ERP. An emergency poses a threat requiring implementation of the ERP if the emergency has the potential to:

- Expose Hawaiian Waste to the environment and thus quarantine risk through a tear or rupture to a waste bale
    - Threaten human health or the environment from fire and/or explosion, or exposure to Municipal Solid Waste or contaminated water
- Contaminate surface water or ground water
- Result in significant soil contamination
- Result in impacts to fisheries resources or
- Disrupt commonly-used transportation routes

If any of these criteria are satisfied, the ERCoordinator will implement the ERP immediately.

Circumstances that have the potential to satisfy one more of the above criteria include:

- Release of solids and/or liquids en route to the Roosevelt Regional Landfill
- Release of liquids from the Roosevelt Regional Landfill
- Fire and/or explosion en route or at the Roosevelt Regional Landfill
- Release of gases en route or at the Roosevelt Regional Landfill
- Vehicle accident en route or at the Roosevelt Regional Landfill

Each circumstance is described briefly in Section 2.3.2.

2.3.2 Types of Emergencies and Actions Required

Table 1 identifies the types of emergencies that have the potential to occur and the nature of response that will be required. The table also identifies who will be responsible for initial response, who will be responsible for mobilizing for a response, and under what circumstances. Emergency situations rarely involve local agencies.

Each type of emergency and the actions that will be required are described in this section. Section

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2.3.3 describes specific procedures that will be followed in emergencies which will require either minor or full ERTeam response by RDC.

Table 1: EMERGENCY RESPONSE

Emergency Situation	Responsible for Response		Type of Response	
	Initial Response	Mobilization Responsibility	Minor ERTeam Response	Full ERTeam Response
Broken Bale - Release of Solids, Gases, and/or Liquids en Route to the Roosevelt Regional Landfill.	RDC	RDC	Likely	Possible
Fire and/or Explosion en Route or at the Roosevelt Regional Landfill.	RDC	RDC	Possible	Likely
Release of Gases en Route or at the Roosevelt Regional Landfill.	RDC	RDC	Possible	Likely

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Table 1: EMERGENCY RESPONSE, CONTINUED

Emergency Situation	Responsible for Response		Type of Response	
	Initial Response	**Mobilization Responsibility**	**Minor ERTeam Response**	**Full ERTeam Response**
Truck Accident en Route or at the Roosevelt Regional Landfill.	RDC	RDC	Possible	Unlikely
Problem With a Truck or Chassis During Short Haul.	RDC	RDC	Possible	Unlikely

Broken Bale and Potential Release of Solids and/or Liquids en Route to the Roosevelt Regional Landfill

In the event of a broken bale and the potential release of solids and/or liquids en route to the Roosevelt Regional Landfill, RDC will be responsible for the initial response which includes determination of the actual response necessary. Response procedures are described in Section 2.3.3 of this ERP.

If solids and/or liquids are released along the transportation route, RDC will be responsible for response.

Fire and/or Explosion En Route or at the Roosevelt Regional Landfill

In the event of fire and/or explosion en route to the Roosevelt Regional Landfill, RDC will be responsible for the initial response and will determine the response necessary. Response procedures are described in Section 2.3.3 of this ERP.

Release of Gases En Route or at the Roosevelt Regional Landfill

The release of gases en route is extremely unlikely. Methane gas generation is highly unlikely due to the baling, wrapping and handling protocols associated with the Hawaiian Waste prior to its delivery to the Dock. If an ERTeam response is required, the procedures described in Section 2.3.3 of this ERP will be followed, as appropriate.

Truck Accident En Route or at the Roosevelt Regional Landfill

In the event of a truck accident en route or at the Roosevelt Regional Landfill, RDC will be responsible for any required response. The ERCoordinator will be notified as soon as possible by the truck driver. The ERCoordinator will notify the Washington State Patrol and Washington State Department of Transportation, as appropriate, to describe the nature, location, date and time of the accident, and other pertinent information. If the accident involves a release of Hawaiian Waste, response procedures described in Section 2.3.3 of this ERP will be followed.

2.3.3 Response to All Other Emergencies

Emergencies either will require minor response to the scene of the emergency, or full ERTeam response to the scene (see Table 1 in Section 2.3.2). It is anticipated that most emergencies will require minor ERTeam response. Procedures that will be followed for each type of emergency are discussed in this section.

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Emergencies Requiring Response to the Scene

If a response to the scene of the emergency is necessary, the ERCoordinator will determine, to the extent possible, the type of response required. Emergencies either will require minor response, involving one or two ERTeam members, or full ERTeam response. In either case, the ERLeader first will determine how many ERTeam Members will respond. The ERLeader will notify the ERTeam Members chosen to respond and brief them on the situation.

At the same time, the ERCoordinator, located at RDC's Roosevelt office, will:

- Contact the caller and advise the caller on response measures to take while the ERTeam is traveling to the scene
- Gather as much information as possible from the caller to determine personnel and equipment needed for the response
- Contact the ERLeader to discuss the type of response necessary and the transportation mode to be used
- Arrange for necessary transportation
- Contact, if necessary, government agencies and officials at the scene to notify them of the ERTeam's location and approximate time of arrival
- If the response involves air transport, arrange for land transport when the ERTeam arrives.

Upon arriving at the scene, the ERLeader will:

- Contact the individual in charge, or take charge if he or she is the only response person on site
- Thoroughly evaluate the situation
- Consult with officials at the scene
- Determine what action will be taken
- Communicate the information to the ERCoordinator, who will then decide if additional resources are necessary.

If the incident involves a broken bale and/or release of Hawaiian Waste, upon arriving at the scene, the ERLeader, will:

- Identify the character, source, amount, and extent of the release
- Assess the direct, indirect, or immediate impacts to human health and the environment that may result
- Direct the ERTeam in containing the release
- Initiate remedial action and cleanup (See Appendix 3.3 for Broken Bale Remediation protocol)
- Arrange for reloading of the waste
- Document the release (i.e., with photographs), and complete the Emergency Response Report (see Appendix 3.5).

Follow-up Actions for All Emergencies Requiring ERTeam Response

After the initial evaluation, the ERLeader will contact the ERCoordinator with updated information on the situation, and request additional personnel or equipment, if necessary. The ERLeader and ERCoordinator will maintain periodic communications throughout the incident until the emergency has been resolved.

The ERTeam will remain at the scene until released by the person in charge. The ERCoordinator will arrange travel for the ERTeam's return to base. The ERCoordinator will contact appropriate government agencies and other interested parties to advise them that the emergency is over.

Refer to Section 2.6 of this ERP for a description of the required post-emergency critique.

2.4 Transportation Procedures

If an ERTeam response to the scene of the emergency is necessary, transportation will be required. The type of transportation used will be determined by the ERCoordinator, based on several factors:

- Urgency of response
- Distance to scene
- Available access to scene
- Amount of equipment needed
- Number of team members required to respond, and
- Weather conditions.

If immediate response is necessary, the fastest mode of transportation to the scene will be used. If air transportation is used, arrangements will be made for travel to the scene from the nearest airfield. The ERCoordinator will make travel arrangements.

If the response is less urgent, or is to provide backup or to relieve another ERTeam Member at the scene, then ground transportation will be used.

2.5 Public Relations

Calls from the news media will be directed to the ERCoordinator identified in Appendix 3.2 of the ERP. If the ERCoordinator is not available, calls will be directed to the person designated by the ERCoordinator as the appropriate media contact. If an ERTeam Member is approached at the scene by a reporter or photographer, the team member will direct the inquiry to the ERLeader.

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Upon arrival at the scene, the ERLeader will:

- Check with the person in charge and notify him or her that the ERTeam will to keep all appropriate people up-to-date on the status of the emergency
- Offer to have appropriate questions from the news media directed to the ERLeader
- Be prepared to answer questions about the ERTeam and its activities
- Keep an informal log of reporters and camera crews with whom the ERLeader has interacted, including their affiliations, telephone numbers, and information communicated.

In talking to the news media, the ERLeader will:

- Be available to respond to questions in the early morning and early afternoon, the most likely times when reporters on deadline will be seeking information
- Brief the news media at least once every 30 minutes on the status of the emergency and, even when new information is not available, be accessible to answer questions that may arise
- Treat television and newspaper representatives equally
- Be brief and factual in responses, never speculate on probable causes, and explain the facts simply, so the reporter will not have to check back later
- Know the facts (an inaccurate or misleading answer can be more detrimental than no answer); if a response is not available, indicate when a response is expected
- Be courteous and responsive, maintain a level, factual tone of voice, and do not get agitated
- Never speak "off the record"
- Never use the words "no comment," use the response: "I don't have enough information to answer that question" or "I really don't think I can talk about that."
- Never attempt to assign a dollar estimate to damage that has occurred
- Never release names of injured people; tell reporters the hospital where the injured people have been taken, if appropriate
- Never comment on the competency or performance of another person responding to the emergency.
- Never attempt to physically restrain a member of the news media (i.e., at a barricade); notify local law enforcement personnel, who will respond appropriately.

2.6 Post-Emergency Critique

Upon return to base, the ERLeader will supervise the cleaning and storage of equipment. The ERLeader will conduct a critique of the incident with all ERTeam Members. The ERLeader will complete an Emergency Response Report (see Appendix 3.5) and provide a copy to the ERCoordinator, RDC management and other responsible agents upon request.

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3.0 APPENDIX

3.1 CALL REPORT

**RDC EMERGENCY
CALL REPORT**

Date______________________________ **Call Report No.** __________________

Time (on/off)______________________ **Call Taken By** __________________

EMERGENCY DISPATCH AGENCY _____________________________________

EMERGENCY CALLER NAME _____________________________________

ORGANIZATION _______________________________

CALL BACK LOCATION _____________________________________

(City, County, State)

CALL BACK TELEPHONE_____________________________________

PROBLEM _____________________________________

(Include Type of Emergency)_____________________________________

____

Time _____________________________________

Details/Injuries _____________________________________

____

____

IMMEDIATE ENVIRONMENTAL CONCERNS _____________________________________

____

____

ACTION ALREADY TAKEN

Police and/or Fire Called? _____________________________________

Railroad and/or RDC Called?

United States Department of Agriculture
Animal and Plant Health Inspection Service
Plant Protection and Quarantine

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ERCoordinator Called? ______________________________________

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LOCATION OF EMERGENCY

(City, County - if other than caller location) ______________________________

Hwy No./Distance-Direction From ______________________________

Weather/Temperature_

Populated/Open Area_

Terrain (flat/hilly/etc.)______________________________

Nearest Airfield ______________________________

Directions to Scene ______________________________

____

____

____

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3.2 EMERGENCY RESPONSE REPORT

(Attach Additional Pages as Necessary)

Date:_____________________ Emergency Response Report No.:________________________

Time:_____________________ Completed By:____

Location & Phone Number Where Report may be Located: (   )____________________________

Type and Location of Incident:____

Date:_______________ Time:______________________

Remediation Completed: Date:______________________ Time:_______________

Response Taken: Date:______________________ Time:_______________

Number of ERTeam Members Reporting to Scene:____

Names of all Team Members Responding:____

____

____

Possible Impacts to Human Health or the Environment:_________________________________

____

____

____

Description of Actions Taken:____

____

____

____

Extent of Injuries, if any:____

____

____

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If Release of Solid Waste is Involved:

Disposition of Recovered Material:____

Identification of Material:____

Quantity:____

Appearance of Site after Cleanup (include before and after photos):____________________

Equipment & Supplies Used:____

Signature ______________________________ Title:______________________

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3.3 Broken Bale Remediation and Cleanup Protocol

Substantially Damaged/Broken Bale Remediation Protocol

Bales that incur only minor ruptures will be repaired by resealing the opening with appropriate adhesive and plastic liner/sheeting.

In the event that a bale is substantially ruptured during RDC transport to the Landfill, the following mitigation measures will be immediately enacted:

1) The ruptured bale and its contents will be isolated.

2) A cleanup crew will scoop up the contents and any remnants of the broken bale and place it in waiting super-sacks – polypropylene bags lined on the interior with a minimum 6-mil plastic liner. The 6-mil plastic liner will be wrapped/folded over the waste and sealed with duct, thus creating a "burrito" wrapped waste bale. The sealed waste bale will then be secured inside the super sack to allow lifting the recovered waste to and from transportation equipment. This "burrito" wrapping of waste has been used effectively, under Washington State Department of Ecology supervision, to manage "contained-in" regulated remediation waste delivered to Roosevelt Landfill.

3) Once the super sack is secured it will be placed on a flatbed trailer for transport to the active face of the Landfill where it will be lifted from the trailer and placed in the waste pile for subsequent coverage by other waste or soil cover. The "burrito" bag will be lifted and placed rather than tipped to ensure that it is not ruptured during tipping.

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3.4 EMERGENCY RESPONSE DIRECTORY

Emergency Response Team (ERTeam) Contacts

Regional Disposal Company

ERCoordinator	Matt Henry (Landfill) (800) 275-5641 (Roosevelt Office) (509) 727-1488 (Mobile)
ERLeader	Dan Wedgwood (800) 275-5641 (Office) (541) 288-7027 (Mobile)
ERLeader (Backup)	Dave Gunderson (800) 275-5641 (Office) (509) 366-2646 (Mobile)
ERTeam Member	Jim Wright (800) 275-5641 (Office)

EMERGENCY RESPONSE DIRECTORY

For 24-Hour Emergency Response Call

Primary Number: (800) 275-5641

Agencies And Locations Where ERP Is Available

The agencies and locations listed below will receive copies of the AOP:

- RDC's Corporate Headquarters
  54 S Dawson St.
  Seattle, WA 98134
  (206)332-7700

- Hawaiian Waste Systems, LLC
  1011 SW Klickitat Way, #C-109
  Seattle, WA 98134
  (206)292-2929

- Klickitat County Public Works
  205 S. Columbus, Room 103
  Goldendale, Washington 98620
  (509) 773-4616

- Roosevelt Regional Landfill Main Office
  P.O. Box 204
  1800 Roosevelt Grade Road
  Roosevelt, Washington 99356
  (509) 374-5641 or
  (800) 275-5641

- State of Washington Department of Ecology
  Central Regional Office
  15 Yakima Way, Suite 200
  Yakima, WA 98902
  509-575-2490

3.5 EQUIPMENT INVENTORY

REQUIRED EQUIPMENT INVENTORY

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RDC maintains several vehicles and pieces of equipment on site at the Roosevelt Regional Landfill for responding to accidents or emergencies in the Roosevelt area, including the following:

-
- tow vehicles
- water storage trucks equipped with a fire hose.

RDC will use these vehicles to assumes responsibility for first response for landfill-related accidents or emergencies in the Roosevelt area.

Table 3.5.1A contains a list and brief description of required emergency equipment, its function, and location at the Roosevelt Regional Landfill.

Table 3.5.1A Emergency Equipment (RDC)

Material/Equipment	Function	Location
Telephone	For routine and emergency communication.	Administration Building
Emergency Vehicle	To provide transport of injured people.	On site
Tow Vehicle	To move disable trucks.	On site
Diesel-powered generator	To provide power for essential equipment.	Maintenance Building
First Aid Kits	To treat minor injuries.	Administrative Building, Shop, Selected Vehicles
Safety Locker	To store emergency equipment.	Maintenance Building
Two-way Radios	For routine and emergency communication.	Administrative Building, assigned to operations personnel
Portable and fixed cellular phones	For routine and emergency communication.	Administrative Building, assigned to operations personnel
Dump Truck	To transfer solid waste to landfill.	On site
Wheelloader	To load spilled solid waste.	On site
Equipment	**Manufacturer/Model**	**Number**
Dozer	Caterpillar/D10R WDA	1
Dozer	Caterpillar/D9L WDA	1
Dozer	Caterpillar/D6H WDA	1
Grader	Caterpillar/14G and 140G	1
Compactor	Various Models	1
Wheelloader	Caterpillar/980 and 966B	1
Excavator	Caterepillar 235 and 320	1
Backhoe	Caterpillar/466	1
Fuel Truck		1
Service Truck		1
Dump Truck		1

WASTE SPILL PROTOCOL ON WATER

AUG-21-2006 MON 03:18 PM BRUSCO TUG & BARGE FAX NO. 3606361521 P. 02

MARINE SPILL RESPONSE CORPORATION
SERVICE AGREEMENT

EXECUTION INSTRUMENT

The **MSRC SERVICE AGREEMENT** attached hereto (together with this execution instrument, the "Agreement"), a standard form of agreement amended and restated as of September 27, 1996, is hereby entered into by and between

Brusco Tug & Barge
[Name of COMPANY]

a Marine Transportation Corporation in State of Washington
[Type of entity and place of organization]

with its principal offices located at 548 14th Ave. Longview, WA 98632

(the "**COMPANY**"), and **MARINE SPILL RESPONSE CORPORATION**, a nonprofit corporation organized under the laws of Tennessee ("**MSRC**"), and shall be identified as

SERVICE AGREEMENT No. 6MPA _ 048 [This is to be provided by MSRC.]

IN WITNESS WHEREOF, the parties hereto each have caused this Agreement to be duly executed and effective as of Jan 21, 1999, 2000

Brusco Tug & Barge [COMPANY]

By: [signature]

Roland B. Brusco [print name]

Title: C.E.O.

Address: 548 14th Ave.
Longview, WA 98632

Telephone: 360-636-3341 Fax 360-636-1521

MARINE SPILL RESPONSE CORPORATION:

By: Judith A. Roos
Judith A. Roos
Marketing & Customer Service Manager
455 Spring Park Place, Suite 200
Herndon, Virginia 20170

703/326-5617; Fax: 703/326-5660

MARINE SPILL RESPONSE CORPORATION SERVICE AGREEMENT

STANDARD FORM OF AGREEMENT

Parties and Background

This is a **SERVICE AGREEMENT** with attached signature pages (the "Agreement") between the **COMPANY** and **MARINE SPILL RESPONSE CORPORATION**, a nonprofit corporation organized under the laws of Tennessee (**"MSRC"**).

For convenience and simplicity, as between the **COMPANY** and Covered Entity (if any), references to the party for performance are made to a "Covered Entity," but the **COMPANY** can exercise the rights and will guarantee the performance of a Covered Entity as set forth more fully in this Agreement.

In consideration of the promises and the mutual covenants of this Agreement, **MSRC** and the **COMPANY** agree as follows:

Articles

ARTICLE I CALLOUT

1.01. <u>Call-Out of Resources</u>

1.01(a). Alert. A Covered Entity may alert **MSRC** of the possibility of a call-out under this Agreement. Upon receipt of an alert **MSRC** will review its readiness to respond in the event of a call-out under Section 1.01(b). Such alert does not (i) obligate the Covered Entity to pay **MSRC**'s rates or any costs incurred by **MSRC**, (ii) obligate **MSRC** to Mobilize any Resources, or (iii) give the Covered Entity any rights to obtain any particular Resources, unless and until **MSRC** is called out in accordance with this Agreement.

1.01(b). Call Out Process. An Authorized Representative, or an individual **MSRC** reasonably believes is acting on behalf of a Covered Entity, may obtain and **MSRC** will provide any of the Resources available under this Agreement by calling an **MSRC** response manager through one of the telephone call-out numbers provided by MSRC from time to time by notice to the **COMPANY**. This Initial Callout Notice shall consist of a specific request for desired Resources to be provided from the list on Schedule 3 (or as otherwise made available by **MSRC** at the time of callout), in consultation with one of **MSRC**'s response managers. The Authorized Representative or the Incident Commander of a Covered Entity may add to or discontinue use of any Resources, in consultation with **MSRC**'s response manager, at any time. The Covered Entity and **MSRC** will document the Resources requested and provided. If MSRC Subcontractors are required to provide the requested Resources, **MSRC** will call out and supervise those MSRC Subcontractors, unless and until other arrangements are made as described in Section 3.04. Part II of Schedule 3 contains the special terms and conditions and call out procedures for MSRC support for transfer operations requiring "Average Most Probable Discharge" response capability under OPA.

1.02. <u>Response to Non-Covered Vessels and Facilities and Other Sources.</u> If **MSRC** is called to respond to a Vessel or Facility or other source of a Discharge for which the **COMPANY** has not demonstrated financial responsibility in accordance with Schedule 2 (including a Vessel or Facility for which **MSRC** is not cited in OPA Response Plans as a spill response contractor), the **COMPANY** must promptly furnish evidence of financial responsibility under Schedule 2 for that Vessel or Facility or source of Discharge.

1. 03. <u>Mobilizing MSRC Response Resources.</u> As soon as practicable under the circumstances after **MSRC** receives an Initial Call-Out Notice or subsequent change to a request, **MSRC** will Mobilize the requested Resources including MSRC Subcontractors.

ARTICLE II. CAPABILITIES

2.01. <u>Resource Availability.</u> Except as otherwise directed by governmental authorities, agreed by mutual consent or as described below, Resources are provided to the **COMPANY** and others on a first-come/first-served basis. Any of the Resources can be requested for any Spill Event, subject to the following restrictions and qualifications, as applicable:

2.01(a). Oil Spill Event outside MSRC's Operational Area. For an Oil Spill Event occurring within U.S. Jurisdictional Waters but outside the Operational Area, **MSRC** will not provide any Resources whose movement is prohibited by law or order of the applicable Governmental Body, or if such movement would invalidate any Response Plan within the Operational Area. In such event, **MSRC** will coordinate with the Covered Entity to seek a waiver of any such prohibition, order or invalidation from the applicable Governmental Body in order to remove this restriction.

2.01(b). Responder Immunity. If at any time Responder Immunity is not available for a Spill Event, **MSRC** may withdraw, or decline to provide, MSRC Response Personnel or any Resources requiring such MSRC Response Personnel, unless other arrangements acceptable to **MSRC** in its sole discretion are made to offset any additional legal and financial risk that may result.

2.01(c). Discharges of substances other than Oil or Discharges outside U.S. Jurisdictional Waters. MSRC may offer from time to time to provide Resources under this Agreement to Spill Events involving substances other than Oil (including Hazardous Substances) or Spill Events outside U.S. Jurisdictional Waters as permitted and in accordance with **MSRC's** policies and procedures adopted from time to time. Any additional or different terms and conditions applicable to the provision of Resources for such non-Oil and non-U.S. Spill Events will be set forth in an addendum to this Agreement executed by MSRC and the **COMPANY** in advance or at the time of callout for the Spill Event.

2.01(d). Conflicting Requests. If the Covered Entity and some other person with whom **MSRC** has a contract both desire the same Resources or otherwise have conflicting requests, **MSRC** will immediately notify and consult with each of the respective incident commanders regarding the conflict. **MSRC** will continue to follow a first-come/first-served approach unless and until it receives timely non-conflicting directions from the incident commanders to redirect Resources or activities. If, after such notice and consultation the conflicting parties still do not agree, **MSRC** will follow the relevant FOSC(s)' non-conflicting directions, if any.

2.02. <u>Changes in Resources Offered.</u> MSRC will periodically update Schedule 3 to reflect changes in the Resources offered under this Agreement, and will give prompt notice to the **COMPANY** in advance where practicable of any significant reduction in response capability.

ARTICLE III ROLES AND PROCEDURES FOR RESPONSE PERFORMANCE

3.01 Responsibilities of the COMPANY and Covered Entity

3.01(a) General Management and Overall Direction. Subject to the power and authority of Governmental Bodies, the Covered Entity will provide general management and overall direction and control of all Response Activities under this Agreement. The Covered Entity shall designate an Incident Commander, who shall be in frequent communication with **MSRC** while **MSRC** is providing Resources under this Agreement. The designated Incident Commander will advise **MSRC** in writing of any non-apparent limitations and restrictions on the authority of the Covered Entity's employees, contractors, and agents to authorize and direct Response Activities of **MSRC** and MSRC Subcontractors. The Incident Commander will also advise **MSRC** of any directions or pertinent concerns of Governmental Bodies or the Unified

Command that affect, or that may reasonably be expected to affect, any Resources or activities under this Agreement. All activities of **MSRC** under this Section 3.01(a) will be subject to the overall direction and control of the Covered Entity.

3.01(b) Care of Resources. The Covered Entity will use its best efforts to operate, maintain, and store any **MSRC** Response Equipment provided without associated **MSRC** Response Personnel in a careful and proper manner under the circumstances and in accordance with applicable law.

3.02 Responsibilities of MSRC

3.02(a) Operational Supervision. MSRC will, within the limits of its available resources, at the Covered Entity's cost and expense, and in accordance with applicable law, provide operational supervision and coordination (i) for Resources, including any MSRC Subcontractor called out by **MSRC** prior to assignment under Section 3.04, and (ii) upon request of the Covered Entity, for any subcontractors called out by or assigned to the Covered Entity. Such supervision shall be in accordance with and subject to the overall direction and control of the Covered Entity's Incident Commander, as described in Section 3.01(a).

3.02(b) Initial Coordination and Communication. MSRC will, upon request, provide an on-scene point of coordination and communication between the Covered Entity and the FOSC and other response officials until the first to occur of: (i) 24 hours after initial callout; or (ii) the Covered Entity's response management team (as contemplated by 33 CFR 155.1035(d)) arrives on-scene and assumes direct management and control.

3.02(c) Governmental Directions. MSRC will immediately notify the Covered Entity's Incident Commander of any directions **MSRC** receives from any Governmental Body which **MSRC** believes may conflict with previous guidance or direction **MSRC** may have received from the Covered Entity. If the FOSC or SOSC gives directions to **MSRC** and **MSRC** does not receive timely directions from the Incident Commander, **MSRC** will follow those FOSC or SOSC directions. In any event, **MSRC** will immediately act on directions from any Governmental Body that relate to personnel safety, alleged violations of law or regulations, immediate endangerment of public health or the environment, or directions that constitute an order or command of a Governmental Body with apparent legal authority. **MSRC** will notify the Incident Commander of those directions and immediate actions as soon as practicable under the circumstances.

3. 03. Response Methods. The Covered Entity will use its best efforts to direct Response Activities, and **MSRC** will provide Resources, in a manner that will (i) comply with all applicable law and (ii) maintain the applicable Responder Immunity of **MSRC** and MSRC Integral Subcontractors. Subject to the provisions of Section 3.02(c), **MSRC** will commit only those resources as are reasonably necessary to carry out the Response Activities or response objectives that **MSRC** has been directed or authorized by the Covered Entity, an Authorized Representative, or Incident Commander to carry out, unless a specific resource(s) is requested by any one of the above-named entity or Persons.

3.04 Covered Entity Directions. When **MSRC** follows directions pursuant to the procedures of Section 3.02, those directions will be deemed to have been provided by the Covered Entity unless and until further or alternative directions are provided in accordance with the terms of this Agreement by the Covered Entity, its Authorized Representative, or Incident Commander.

3.05 Subcontractors. MSRC will retain MSRC Subcontractors under terms and conditions agreeable to the MSRC Subcontractors and **MSRC**. **MSRC** will provide to a Covered Entity, on request, a copy of **MSRC**'s contract with any **MSRC** Subcontractor (except for MSRC Integral Subcontractors). Upon request by a Covered Entity and consent of the MSRC Subcontractor, **MSRC** will assign the rights and obligations of **MSRC** under the subcontractor contract with respect to that Spill Event to the Covered Entity (except for MSRC Integral Subcontractors whose contracts are not assignable). Unless the Covered Entity directs otherwise, **MSRC** generally will provide, at the Covered Entity's expense in accordance with Schedule 3, support services necessary to sustain and support ongoing response operations of **MSRC** and MSRC Subcontractors, including food service, lodging, local transportation, safety and medical support, and other support for personnel, and fuel, docking, garage, hangar and similar support services for vessels, aircraft, and vehicles. However, the Covered Entity must provide such support services if the response occurs outside **MSRC**'s Operational Area and **MSRC** does not have preexisting arrangements for such support services.

3.06 Safety

3.06(a) MSRC and its Subcontractors. **MSRC** will observe and require its employees and MSRC Subcontractors to observe relevant safety laws and regulations and applicable **MSRC** safety policies and procedures. While on a Covered Entity's facilities or vessels, **MSRC** will comply and require its employees and MSRC Subcontractors to comply with the Covered Entity's specific instructions concerning safety policies and procedures provided to them by the Covered Entity. **MSRC** will report and require its employees and MSRC Subcontractors to report to the Covered Entity as promptly as practicable any accidents associated with the Resources resulting in or that reasonably could have resulted in serious personal injury, death, or material property damage or loss. At the completion of the applicable Response Activities by **MSRC** but in any event within the time required by law, **MSRC** will provide to the Covered Entity all Occupational Safety and Health Act (OSHA) injury and illness reports involving **MSRC** employees provided under this Agreement.

3.06(b) Covered Entity and its subcontractors. The Covered Entity will observe and require its employees and subcontractors to observe relevant safety laws and regulations and applicable Covered Entity safety policies and procedures. While on **MSRC**'s facilities or vessels, the Covered Entity will comply and require its employees and contractors to comply with **MSRC**'s specific instructions concerning safety policies and procedures provided to them by **MSRC**. The Covered Entity will report and require its employees and subcontractors to report to **MSRC** as promptly as practicable any accidents associated with the Resources resulting in or that reasonably could have resulted in serious personal injury, death, or material property damage or loss. At the completion of the Response Activities by **MSRC** but in any event within the time required by law, the Covered Entity will provide to **MSRC** all OSHA injury or illness reports relating to the employees of the Covered Entity suffering injury or illness while on **MSRC**'s facilities or vessels.

3.06(c) Reasonable Interpretation. The obligations of **MSRC** and Covered Entity under this Section 3.06 are not intended to hold the parties to a standard that would be unreasonable under the actual conditions of a particular Discharge or threat of Discharge and the inherent difficulties and danger of emergency response. All **MSRC** and Covered Entity actions carried out consistently with the directions of the FOSC or SOSC, or with approval of applicable safety officials, will be deemed to be in compliance with this Section 3.06.

3. 07. Recovered Product or Waste.

3.07(a) Definitions. For purposes of this section:

(i) "Management" means generation, recovery, transportation, storage, treatment, handling, disposal, disposition, possession, control, operation, ownership, importation, or exportation.

(ii) "Recovered Product or Waste" means contained or recovered Oil, oily waste, Hazardous Substances, or mixtures thereof, including contaminated properties.

(iii) "Charges" means license fees, import or export duties, tariffs, taxes, tipping fees or other costs or charges imposed by any Governmental Body with respect to Recovered Product or Waste.

3.07(b) Allocation of Responsibility. As between MSRC and the Covered Entity, the Covered Entity bears all risk, liability, and responsibility for and will perform or otherwise satisfy all duties and obligations and pay all Charges associated with the Management of Recovered Product or Waste.

3.07(c) Covered Entity's Responsibilities. The Covered Entity will promptly provide to MSRC:

(i) the necessary documentation for MSRC to deliver Recovered Product or Waste for transportation by others to the selected facilities;

(ii) appropriate instructions (orally and promptly confirmed in writing) for the Management of Recovered Product or Waste;

(iii) access to facilities, vessels or other receptacles for receipt or disposal of Recovered Product or Waste.

3.07(d) MSRC Actions. If the Covered Entity fails to meet any of its obligations in (a) or (b) within a reasonable time after request by MSRC, MSRC can:

(i) discontinue operations that depend on the Covered Entity's actions; or

(ii) make the appropriate arrangements for Management of Recovered Product or Waste in the name, on behalf, and at the sole cost and expense of, the Covered Entity.

3. 08. <u>Information Coordination and Control.</u> Except as provided below or as otherwise directed or permitted by the Covered Entity, **MSRC** will maintain as confidential all information that (i) **MSRC** obtains from any Covered Entity, MSRC Subcontractor or other subcontractor participating in the Spill Event on behalf of the Covered Entity and (ii) the Covered Entity reasonably designates as confidential. **MSRC** will coordinate all media and public responses by **MSRC** with the Covered Entity, in advance of the responses if feasible. The Covered Entity may provide **MSRC** with a Public Information Plan ("PIP") that identifies the Covered Entity's specific processes, policies, and guidelines with respect to interaction with the public and the media, which the Covered Entity may amend or supplement from time to time. **MSRC** will follow those policies and guidelines and may reference that guidance in responding to any media inquiries. If the Covered Entity has not provided **MSRC** with a PIP, **MSRC** will handle inquiries using its judgment considering **MSRC**'s view of the overall best interests of the Covered Entity, restricting its remarks to factual information about the activities of **MSRC** and MSRC Subcontractors. In any event, **MSRC's** officers also may respond to unsolicited inquiries by giving factual information about the activities of **MSRC** and MSRC Subcontractors, but will avoid speculation or expression of opinion about the Spill Event or the conduct of the Covered Entity in response to the Spill Event.

ARTICLE IV. LIMITS ON WHAT IS OFFERED

4.01. <u>Excluded Services.</u> MSRC's services do not include: (1) Disposal of waste, including recovered Oil, oily waste, and any Hazardous Substances; (2) Source control; (3) Wreck removal; (4) Natural resource damage assessment; (5) Third-party damage claims evaluation or adjustment; (6) Acting as Incident Commander for the Covered Entity; (7) Development or preparation of Response Plans; or (8) shoreline remediation performed in conjunction with the Natural Resource Trustees to restore the shoreline to its pre-spill condition, rather than as part of the cleaning process carried out under the oversight of the FOSC. However, if **MSRC** becomes involved in any of these activities, these activities will be governed by the terms and conditions of this Agreement.

4.02. Limits on Use by Covered Entity. The Resources provided under this Agreement will be used only for the Spill Event or exercise for which they were requested.

4.03. Personnel with Equipment. The Covered Entity may obtain the requested MSRC Response Equipment with or without MSRC Response Personnel, at the option of the Covered Entity. However, if **MSRC** reasonably believes, under the circumstances of a given event or request, that MSRC Response Personnel are required to ensure proper care, operation, and maintenance of certain MSRC Response Equipment as indicated in Schedule 3, **MSRC** may require that the MSRC Response Equipment be obtained only with the appropriate MSRC Response Personnel.

4.04. Acknowledgment of Representations and Conditions. The Initial Call-Out Notice will constitute an acknowledgment to **MSRC** that:

4.04(a). Representations and Warranties True and Correct. To the best actual knowledge of the **COMPANY**, each of the representations and warranties of the **COMPANY** set forth in Section 8.01 is true and correct in all material respects at the time of the Initial Call-Out Notice.

4.04(b). Conditions to Response Satisfied. The Covered Entity has made a good faith determination (based on the information reasonably available to the Covered Entity at the time) that the Spill Event meets or will meet each of the applicable restrictions or qualifications under Article II relating to the requested Resources, and the following criteria:

(i) No Event of Default exists at the time of the Initial Call-Out Notice;

(ii) For response in U.S. Jurisdictional Waters to a Discharge or threat of Discharge that equals or exceeds 1200 barrels, the FOSC is either Directing or monitoring the Response Activities at the Discharge or threat of Discharge where the Resources are to be deployed; and

(iii) The Covered Entity will be able to take, on a timely basis, all actions required in Article VII.

ARTICLE V. TERMINATION or SUSPENSION OF RESOURCES

5. 01. Suspension of MSRC's Obligation to Provide Resources. **MSRC** may suspend its obligation to provide Resources in whole or in part under this Agreement for a Spill Event upon written notice to the Covered Entity if and to the extent **MSRC** reasonably determines such suspension is necessary to protect **MSRC**'s material interests as a result of the occurrence and continuation of any of the following:

(a) a Covered Entity instructs **MSRC** to act under this Agreement in a manner which would be illegal, unsafe, or in violation of or breach this Agreement in any material respect,

(b) a Force Majeure Event,

(c) the unavailability of Responder Immunity,

(d) the unavailability of subcontractors essential to enable MSRC to provide requested Resources, or

(e) the existence of other similar circumstances beyond **MSRC**'s reasonable control that materially adversely affect MSRC's ability to perform as contemplated under this Agreement and that **MSRC** is unable with reasonable diligence to timely

SCHEDULE 3

PART I
RESOURCES
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Resources for onwater containment and recovery, shoreline protection and other activities are available through selection of specific MSRC Response Equipment, MSRC Response Personnel and MSRC Subcontractors, as further described below.

A. MSRC Response Resources (Equipment and Personnel):

To provide the Covered Entity maximum flexibility in selecting what Resources are needed based on the unique circumstances of each Spill Event, MSRC offers MSRC Response Equipment and MSRC Response Personnel at the rates set forth in Part III of this Schedule 3. Part III of this Schedule 3 also identifies: (i) the menu of MSRC Response Equipment; (ii) the major components of each system of MSRC Response Equipment; (iii) the MSRC Response Equipment which must be accompanied by MSRC Response Personnel; and (iv) the MSRC Response Equipment which may require MSRC Subcontractor support. Part III of this Schedule 3 will be effective from and after April 15, 2001.

B. MSRC Subcontractors and Other Response Capabilities:

Through MSRC Subcontractors and arrangements with other contractors, MSRC offers additional Resources and capabilities as follows:

1. **Onwater Resources and Other Support for Spill Response:** MSRC can assist the Covered Entity by calling out and supervising MSRC Subcontractors to provide various spill response equipment and personnel, response support, and specialized expertise to supplement MSRC Response Equipment and MSRC Response Personnel. Examples include: additional types or quantities of boom, skimmers, storage barges, vessels (for various tasks such as skimming platform, booming, personnel and/or supply transport, etc.), consumables, portable toilets, lighting, trailers/tractors for land transportation, safety supplies and services, security services, and material handling equipment.

2. **Shoreline Clean-up:** MSRC offers shoreline clean-up capabilities through MSRC Subcontractors.

3. **Firefighting (FI/FI), Salvage and Lightering Services:** MSRC can assist the Covered Entity in contracting for FI/FI, salvage and lightering services. The contract for such services will be between the FI/FI, salvage and Lightering contractor and the Covered Entity.

4. **Average Most Probable Discharge (AMPD):** MSRC will arrange for appropriate resources to satisfy the planning requirements for AMPD in accordance with the procedures outlined in Part II of this Schedule 3.

5. **Wildlife Hazing, Rescue or Rehabilitation:** MSRC will assist in identifying an appropriate available Contractor to provide resources necessary for wildlife hazing, rescue or rehabilitation.

SCHEDULE 3

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6. **Non-Spill Events:** MSRC may offer assistance with natural and manmade disasters other than Spill Events. MSRC services for such Non-Spill Events are provided at the rates (and other terms and conditions) set forth in this Schedule 3, and will require execution of a Non-Spill Event Addendum to this Service Agreement.

2. Example Compliance Agreement for Handling Hawaiian GRG in the Continental United States.

UNITED STATES DEPARTMENT OF AGRICULTURE ANIMAL AND PLANT HEALTH INSPECTION SERVICE PLANT PROTECTION AND QUARANTINE **COMPLIANCE AGREEMENT**	According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0579-0054. The time required to complete this information collection is estimated to average 1.25 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.
1. NAME AND ADDRESS OF PERSON OR FIRM **Hawaiian Waste Systems, LLC 1011 SW Klickitat Way, #C-109 Seattle, WA 98134**	2. LOCATION
3. REGULATED ARTICLE(S) **Garbage and Regulated (domestic) Garbage from the State of Hawaii**	
4. APPLICABLE FEDERAL QUARANTINE(S) OR REGULATIONS 7 CFR 330.400, 7 CFR 318.13, 7 CFR 318.47, 7 CFR 318.30, 7 CFR 318.60, 9 CFR 94.5 ,	

5. PORTS OF COVERAGE:

WASHINGTON STATE AREAS (Covered by) USDA OFFICES IN: Spokane, Seattle, Ellensburg

6. I/We agree to the following:

General

This Compliance Agreement (CA) that regulates the handling and transport of Garbage and Regulated (domestic) Garbage of Hawaiian origin only authorizes Hawaiian Waste Systems, LLC and its authorized representatives to handle and transport Garbage and Regulated (domestic) Garbage from the State of Hawaii to the Roosevelt Regional Landfill, Washington, in accordance with the provisions of the applicable Federal Quarantines and the Administrator's approval and under the following conditions approved by the United States Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection and Quarantine (USDA, APHIS, PPQ). Specifically, this Compliance Agreement applies to the handling and disposal of Garbage and Regulated (domestic) Garbage from the State of Hawaii, baled in adhesive backed plastic film barriers made of low density polyethylene (LDPE). The bales are to be transported from the State of Hawaii by barge to Roosevelt, Washington, by truck to the Roosevelt Regional Landfill in Klickitat County, and then buried without breaking and spreading waste and in accordance with the regulations for solid waste disposal and all applicable Federal, State, and Local ordinances. All Foreign Garbage, not of Hawaii origin, is specifically prohibited from movement under this compliance agreement.

DEFINITIONS

Terms found in the agreement shall refer to the following:

Agricultural waste Byproducts generated by the rearing of animals and the production and harvest of crops or trees. Animal waste, a large component of agricultural waste, includes (e.g.) feed waste, bedding and litter, and feedlot and paddock runoff from livestock, dairy, and other animal-related agricultural and farming practices.

Bale means the confined unit of Garbage and Regulated (domestic) Garbage that has been approved for transport and burial. Bales are formed meeting all APHIS requirements in 7CFR330.

Barge means the conveyance via ocean and Columbia River on which the Garbage and Regulated (domestic) Garbage will be carried.

Collections of agricultural waste and yard waste refers to bulk collections/pick-up of waste which is made up of primarily agricultural waste and yard waste. All collections of agricultural and yard waste shall not be accepted.

Commingling means the mixing of any regulated and non-regulated materials (including incinerated ash) within the bales, at any staging or transport area.

Company Name – Hawaiian Waste Systems, LLC; (HWS)

Compression refers to the process in which the waste articles are crushed under high pressure, expelling air from, and compacting waste articles into a high density bale.

Foreign Garbage means all materials, associated with fruits, vegetables, meats or animal products, that have been removed (in Hawaii) from any means of conveyance originating from a port outside the continental United States (including Alaska) or Canada, which has not been treated in accordance with 7 CFR part 330 for foreign pests and animal diseases. The disposal method described in this compliance agreement has not been evaluated for the risk of animal diseases.

Garbage is defined as urban (commercial and residential) solid waste from municipalities on any Hawaiian island.

Inspector A properly identified employee of the USDA or other person authorized by the USDA to enforce the provisions of the Plant Protection Act and related legislation, quarantines, and regulations.

Offloading means to move bales from the means of conveyance to its final destination spot; the bales will not be placed on any other means of conveyance.

Patch is made of impermeable film made of low density polyethylene, of at least 16 micrometers thickness, that is coated on one side with a non-hardening mastic/adhesive. The patch must be sufficient to establish an airtight seal.

Plant pest means any living stage of any insects, mites, nematodes, slugs, snails, protozoa, or other invertebrate animals, bacteria, fungi, other parasitic plants or reproductive parts thereof, viruses, noxious weeds, or any organisms similar to or allied with any of the foregoing, or any infectious substances which can directly or indirectly injure or cause disease or damage in any plants or parts thereof, or any processed, manufactured, or other products of plants.

PPQ Hawaii means the local office of the United States Department of Agriculture, Animal Plant Health Inspection Service, Plant Protection and Quarantine (USDA, APHIS, PPQ), Port of Honolulu located at 3375 Koapaka Street, Honolulu, HI 96819, phone number, (808) 861-8446 and fax, (808) 861-8450.

PPQ Washington means an office of the USDA, APHIS, PPQ in Washington State; located at 222 N. Havana Street, Spokane, WA 99202, phone number, (509)353-2950 and fax, (509)353-2637.

Puncture - any hole which is found in the plastic of the bale which goes through all four layers of the wrapping.

Regulated (domestic) Garbage refers to articles generated in Hawaii that are restricted from movement to the continental U.S. under various quarantine regulations established to prevent the spread of plant pests (including insects, disease, and weeds) into areas where the pests are not prevalent.

Rewrapping means the entire bale is rewrapped again using the exact same material and same amount of materials as in the initial wrap of bales. The original wrap will not be removed from the bale.

Roosevelt Regional Landfill refers to the landfill site located at 500 Roosevelt Grade Road, Roosevelt, Washington.

Rupture refers to a rupture or tear in the wrapping film where an observer or inspector is able to see Garbage and Regulated (domestic) Garbage that is no longer covered by film.

Shredding refers to the process used to reduce bulky articles into scraps.

Soil means the loose surface material of the earth in which plants grow, in most cases consisting of disintegrated rock with an admixture of organic material and soluble salts.

Staging Area refers to the solid flat impervious surface of asphalt or cement located at Roosevelt, WA where the bales will be staged pending transport to final destination. Wrapping machine will be located at this location.

Tear means any rupture found in the plastic of the bales which goes through all four layers of wrapping.

Transloading means the movement of Garbage and Regulated (domestic) Garbage from one means of conveyance to any other means of conveyance.

Transport Area refers to the location where bales approved for movement onto the barge are positioned for loading. The transport area is located pier side of Pier 5 at Kalaeloa Barbers Point Harbor.

Washington compliance agreement refers to the agreement between PPQ Washington and Hawaiian Waste Systems, LLC, 1011 SW Klickitat Way #C-109, Seattle, WA 98134.

Wrapping The wrapping material shall be an impermeable film made of low density polyethylene, of at least 16 micrometers thickness, that is coated on one side with a non-hardening mastic/adhesive. Bales are mechanically wrapped to achieve an air tight seal.

Wrapping Area refers to the station where the bale wrapping machinery is located. The wrapping equipment will be located at the baling facility in Hawaii and the staging area at the Port of Roosevelt.

Yard waste – Solid waste composed predominantly of grass clippings, leaves, twigs, branches, and other garden refuse.

Garbage and Regulated (domestic) Garbage Handling Procedures

The risk assessments for the movement of Garbage and Regulated (Domestic) Garbage were conducted based on the specific details provided by HWS. These details include the exclusion of incinerator ash and the removal of all hazardous and liquid waste prior to baling. HWS will notify PPQ if the company plans change to include such materials so that the proper risk assessments can be conducted.

Garbage and Regulated (domestic) Garbage arriving by transport barge in Washington State from State of Hawaii will be categorized as Garbage and Regulated (domestic) Garbage. All Garbage and Regulated (domestic) Garbage arriving in Washington State will be baled using technology specified in 7 CFR 330.400, to create wrapped bales weighing approximately 1.5 to 4 tons. All waste bales shall be structurally sound and wrapped with a minimum of four layers of low density impermeable plastic film to provide an airtight and leak-proof enclosure. This will be demonstrated by conformance to applicable Hawaii Compliance Agreements. The Garbage and Regulated (domestic) Garbage will be continually maintained in securely closed and leak-proof bales which have been properly sealed in Hawaii, and will be disposed of in an approved manner at the Roosevelt Regional Landfill in Washington State. Every necessary precaution must be taken to reduce risk of opening or damage to the bale in Washington where the garbage is a quarantine article.

Upon arrival in Washington State the bales of Garbage and Regulated (domestic) Garbage will be routed directly to the Port of Roosevelt and inspected by a HWS supervisor to verify that the wrapping of the bales is intact. The condition of bales will be noted on the manifest for each numbered bale. The Garbage and Regulated (domestic) Garbage will be kept completely segregated at all times from all other kinds of waste and non-regulated garbage during packaging and staging to eliminate commingling of materials. Any other material (regulated or non-regulated, such as non-rolling equipment, empty containers, and non-regulated recyclables) placed on the same barge as the bales of Garbage and Regulated (domestic) Garbage must be secured to the barge in such a manner that they will not move or come in contact with the wrapped bales. Any other material placed on the same barge much be separated from the bales of Garbage and Regulated (domestic) Garbage approved for movement under this compliance agreement and must be easily distinguishable from the bales of Garbage and Regulated (domestic) Garbage approved for movement under this compliance agreement.

Equipment used during transloading operations will be appropriately blunted to minimize the potential for punctures, ruptures, or tears. A HWS supervisor will be present during all trans-loading and ensure proper handling equipment is used.

Each bale will be inspected and marked with a manifest and tracking identification number. The inspection of the wrapping of the bale will be noted on the bale manifest prior to allowing the bale to progress to the next protocol step.

Any time a puncture, rupture, or tear is detected, the bale will be visibly marked and moved to a designated area for subsequent patching or rewrapping. Punctures, ruptures, and tears which are 6 inches or smaller, will be covered with an adhesive patch which will extend at least 6 inches beyond the limits of the tear or puncture. Punctures, ruptures, and tears which are more than 6 inches, will be covered with a patch and then re-wrapped. Any bales that have been repaired shall be prioritized for immediate transport to the landfill. The bale manifest will note any patch, any re-wrapping, and delivery to the landfill. If a bale is broken open, appropriate clean up procedures will be implemented per the clean up protocols of this compliance agreement.

A wrapping machine will be located at the Port of Roosevelt which is currently the only transfer, staging and handling point approved for transloading. HWS will establish protocols for ensuring wrapped bales are properly inspected throughout the handling and loading processes. These protocols will be written, and available to USDA APHIS and/or its designated cooperators and HWS supervisors.

The protocol must include at least one point in the process where the wrapping around the bale is completely and thoroughly inspected from every angle for punctures or tears. HWS will have a supervisor present at the transloading from barge to truck at the Port of Roosevelt, WA docks and must be able to safely view this inspection in action. A record on the bale manifest will show by initials or some other accountable way that a thorough inspection was performed and that no punctures or tears were found.

Imperfectly sealed bales will be visibly marked and sent to the staging area for rewrapping. Movement and rewrapping of bales will be recorded on the bale manifest. Bale identification numbers of bales requiring rewrapping prior to departure from Hawaii will also be available for review.

Bales will be re-inspected for punctures, ruptures, and tears any time the bales are moved or an incident occurs that would increase risk of puncturing, rupturing or tearing the bales.

The Staging and Transport Area

This is a new process for handling Garbage and Regulated (domestic) Garbage from Hawaii. The integrity of the bales at the Hawaii port is important to review and maintain throughout the entire baling and transportation process. All punctures, ruptures, and tears will be documented and reported regularly. All spills will be documented on the bale manifest and reported immediately to the HWS Supervisor for proper cleaning in accordance with Appendix 1 of this compliance agreement. All spills will be reported to PPQ immediately.

Garbage and Regulated (domestic) Garbage handling procedures pertinent to the transport and staging areas will be conspicuously posted. The procedures must be in English and other appropriate languages.

The staging and transport area shall be kept clean and free of loose garbage and soil. The areas will be controlled for birds, rodents, mollusks, and any other pests that may be attracted to the bales.

Very little biodegradation or production of gases occurs in the properly compressed and wrapped bales. Therefore, wrapped bales which exude unusual odors, or bulges could indicate improper processing and will immediately be completely rewrapped. The bale identity and the company's supervisor inquiry will be noted for tracking results. Re-wrapped bales will be prioritized for movement to the landfill.

After inspection at the first port of call at Roosevelt, Washington the Garbage and Regulated (domestic) Garbage will be trucked to the Roosevelt Regional Landfill.

The designated landfill, Roosevelt Regional Landfill meets the criteria of a modern facility that meets regulations and EPA guidelines for design and operations. HWS will immediately notify Honolulu and Washington PPQ if the landfill fails to meet these standards and will discontinue transport of Garbage and Regulated (domestic) Garbage until authorized by PPQ.

USDA, APHIS, or its designated cooperators in Washington shall be notified by facsimile 48 hours in advance (during normal business hours -Monday-Friday, 0730-1600 hours) of each Garbage and Regulated (domestic) Garbage shipment arrival at the mouth of the Columbia River. This notification may be followed up with alternate means of communication (i.e. phone, email) at the discretion of HWS.

The notification shall include:

Barge name and Voyage no.

Date of departure from the State of Hawaii

First Port of Entry to continental U.S.

Estimated date and time of arrival at the first port of entry to Continental U.S.

Name and phone number of the contact personnel responsible for the shipment.

A list of the identification numbers for the bales in the shipment.

USDA APHIS or its designated cooperators will be notified by facsimile 48 hours prior to the trans-loading of the Garbage and Regulated (domestic) Garbage from the staging area to road trailers (during normal business hours -Monday-Friday, 0730-1600 hours). This notification may be followed up with alternate means of communication (i.e. phone, e-mail) at the discretion of HWS. The company must have a supervisor on site at all times to monitor the loading and securing of the bales on the trailers before transport to the Roosevelt Regional Landfill.

Garbage and Regulated (domestic) Garbage staged at the Port of Roosevelt will be cleared from the staging area prior to the arrival of a second barge but in no way shall the total of 75 days from the date of wrapping be exceeded. Once the bales are transported from the staging area to the landfill they must be buried in lined landfill cells under a minimum of 6 inches of soil in the Roosevelt Regional Landfill within 24 hours of arrival as required by EPA guidelines. The landfilled bales must be completely buried under a minimum of 7 feet of material in the Roosevelt Regional Landfill within 75 days of being staged in Hawaii.

A HWS supervisor will be present during all handling and transport of Garbage and Regulated (domestic) Garbage. The company operates under this compliance agreement and operations will be monitored by USDA APHIS and/or its designated cooperator.

The vehicle transporting the bales of Garbage and Regulated (domestic) Garbage from the Roosevelt, WA docks must take a direct and expeditious route to the Roosevelt Regional landfill where burial will take place. Drivers must report any spills or breakage immediately to the HWS Supervisor for proper cleaning. The spill or breakage must be cleaned immediately according to Appendix 1 of this compliance agreement. All spills or breakages must be documented on bale manifest and reported to PPQ immediately.

HWS will arrange and ensure the transport of Garbage and Regulated (domestic) Garbage directly to the Roosevelt Regional landfill by the transportation method and route approved under the APHIS-PPQ Washington State Compliance Agreement. Routing will be shown on the shipping manifests for the barge, and will be available for review.

The routing of Garbage and Regulated (domestic) Garbage from Hawaii is to be directly to the Roosevelt, WA dock. Hawaii PPQ will approve the routing which shows the designated Port of Entry. No other stops are approved while enroute to the Roosevelt, WA dock.

Transloading of the Garbage and Regulated (domestic) Garbage from barge to barge is prohibited. Transloading of the Garbage and Regulated (domestic) Garbage from barge to over-the-road carriers/trailers will be restricted to the designated staging area at the Port of Roosevelt dock and inter-modal facility.

HWS will use only the Roosevelt Regional Landfill as described under the APHIS-PPQ Washington State office Compliance Agreement. Any deviation from this designated landfill must be authorized through a different Compliance Agreement approved by USDA-APHIS-PPQ.

HWS is responsible for all Garbage and Regulated (domestic) Garbage it transports and will not allow its unauthorized removal, diversion, or use.

Should HWS subcontract transport, handling, storage, or final destination of Garbage and Regulated (domestic) Garbage to another firm then that firm must also be a USDA approved company and under compliance with USDA, APHIS, PPQ. PPQ in Hawaii and Washington will be notified in advance if another firm is to be used. Substitution and approval is NOT automatic. Movement of Garbage and Regulated (domestic) Garbage may be temporarily or indefinitely delayed depending on the outcome of the approval process.

Bales which are punctured, ruptured, or torn and require rewrapping must be visibly marked for easy observation. The marked bales will be moved to the designated staging area for bales requiring rewrapping. The staging area will clearly separate bales for rewrapping from other bales.

Garbage and Regulated (domestic) Garbage must be processed under the described conditions and securely lodged on the barge prior to departure from Hawaii. To avoid accidental shipment of bales marked for rewrapping, bales for rewrapping must be immediately removed and separated from the bales for immediate transport. This separate area will be clearly designated for both the garbage handlers and the inspector.

Marking and Identification of Bales

The bales must be permanently marked with the words **"REGULATED GARBAGE,"** printed in a contrasting color to the wrap. The size of the letters shall be 3 inches in height and easily visible and legible.

Manifest and tracking identification numbers required on each bale include the Bale Identification Number, the Date Wrapped, and the Date Placed in Staging Area. These markings must be in a contrasting color to both the wrap and the words **"REGULATED GARBAGE."** Markings on all bales must be viewable without moving the bales or climbing on top bales by the USDA APHIS PPQ inspector and/or designated cooperators. If markings are not viewable as stated above, a HWS operator will need to move the bales for viewing.

<u>Transport, staging and handling areas</u>

Wrapped bales are clean and shall be handled so that they stay free of soil and attractant debris. No "grounding" or staging of the bales on Washington soil will be allowed. All staging will be conducted on a level, solid and impervious surface of asphalt or cement.

All necessary safety precautions and anticipated precautions will be discussed with Washington PPQ prior to set up of the equipment.

Any bale dropped or torn during the transport process must be immediately patched or removed and rewrapped.

Bales will not be lifted higher than 3 meters except by recorded incident/explanation.

All Garbage and Regulated (domestic) Garbage must be protected from birds, rodents, and mollusks during staging and transport.

The bales of Garbage and Regulated (domestic) Garbage will be isolated from close proximity to exposed fresh fruits, plants, or other activities which may attract hitchhiking plant pest. Barriers will be erected if this occurs due to unusual and unavoidable circumstances if the operations cannot be moved.

CLEANUP PROCEDURES FOR GARBAGE AND REGULATED (DOMESTIC) GARBAGE SPILLS AND EQUIPMENT

HWS must provide personnel and appropriate measures to control the Garbage and Regulated (domestic) Garbage in the event of a spill or other emergency. HWS will follow the clean-up protocols specified for spills as outlined in Appendix 1 of this compliance agreement. Any changes to these protocols must be reviewed and approved by USDA, APHIS, PPQ, and all appropriate Federal, State and Local regulations.

In the event of a spill or leak the trailer must be cleaned at the disposal site by using a method approved for use at the site. The barge transport must also be inspected for spills that may have occurred during transit.

A contingency plan should be in place to handle any spills or breakage during any part of the voyage, transloading, offloading, and/or transportation of the bales. All company employees, designees, drivers, and handlers of the baled Garbage and Regulated (domestic) Garbage shall be informed of the contingency plan.

Waste Spill Protocol for the breakage of bales on land

In the event that a bale is ruptured during offloading, the following mitigation measures will be immediately enacted:

4) The ruptured bale and its contents will be isolated .

5) A cleanup crew will scoop up the contents and any remnants of the broken bale and place it in waiting super-sacks – polypropylene bags with spread straps for machine lifting --lined on the interior with a 6-mil plastic liner.

6) Once loaded, the plastic liner inside the super-sack will be folded over the material and sealed with duct tape, thus creating a “burrito” wrapped waste bale. The sealed waste bale will then be secured inside the super sack to allow lifting the recovered waste to and from transportation equipment.

4) The super-sacks will be lifted with a forklift or similar equipment and placed on a flatbed trailer or similar transportation equipment for transport to the active face of the Landfill.

Upon reaching the active face of the Landfill the super sacks containing “burrito” bags will be lifted and placed in the waste pile for subsequent coverage by other waste or soil cover.

APPENDIX 1 clean up protocols will be follow, attached to this document.

If spillage occurs during transport, USDA, APHIS, PPQ must be notified immediately. See list of contact numbers provided below:

Contact Numbers

The contact phone and fax numbers for the USDA offices are as follows:

USDA OFFICE	CONTACT	PHONE	FAX
Spokane, WA	George Bruno or Steve Miller	(509) 353-2950	(509) 353-2637
Ellensburg, WA	Jordan Krug	(509) 925-1188	(509) 925-4678
Seattle, WA	Barbara Chambers, SPHD	(206) 592-9057	(206) 592-9043

TRAINING

HWS shall present a training program to employees before they are permitted to handle and transport or supervise the handling and transport of Garbage and Regulated (domestic) Garbage. This training program should be at least one (1) hour in duration. Previously trained employees shall be provided review training annually. A record of employees and their training dates shall be maintained and available for PPQ review.

The training package must be approved by the local PPQ officer in charge, and may include both formal classroom training and on-the-job training. It must contain the following topics:

Procedures for maintaining control of Garbage and Regulated (domestic) Garbage

Define "Garbage" and "Regulated (domestic) Garbage" and "Foreign Garbage"

Explain the regulation and its purpose.

Explain the compliance agreement and its purpose.

Include film, slides, or other training aids on Hawaiian soil, plant diseases and pests

Specifically outline, by demonstration, illustration, or picture, proper regulated garbage handling procedures and transport.

Explain the manifesting process.

Be presented in English and other appropriate languages.

Procedures for reporting and data; procedures and reporting results of inspection of bales

Procedures for cleaning affected equipment and areas.

Records of training administered to employees shall be made available to PPQ personnel upon request.

RECORDS AND MONITORING (INSPECTIONS)

HWS must maintain a log which records bale identification, date of baling, inspections done, any remedial measures (e.g., patches, rewrapping), and must document any spills or other mitigation actions taken.

HWS must maintain records to indicate the date, weight, container number, and seal number when each load is destroyed. The records must be maintained and be available upon request by USDA-APHIS-PPQ.

HWS must maintain a log which records the date, time, number, type and weight of the containers of Garbage and Regulated (domestic) Garbage transported and disposed of, and the name of the vehicle's driver. This log will be made available to PPQ upon request. These records must be kept for a minimum of 3 years from the end of the month that the movement was made.

To ensure compliance, PPQ officers will be permitted access to the firm's premises and relevant records without prior appointment.

ENVIRONMENTAL PROTECTION AND OTHER REGULATORY AGENCIES

By signing this agreement, the signer certifies that his/her facility has met or will meet the requirements of all applicable environmental and any other applicable regulatory authorities in addition to the Garbage and Regulated (domestic) Garbage handling procedures specified by the Animal and Plant Health Inspection Service.

NOTIFICATION

PPQ shall be notified within 7 days of any change in business status, business operations, telephone number, business address, management, ownership or business dissolution.

COMPLIANCE

This compliance agreement is nontransferable. If the person identified in section 7 as the signer of PPQ Form 519 leaves their present employer, company or position, then he/she must notify the local PPQ office immediately. This agreement will then be terminated.

If Garbage and Regulated (domestic) Garbage is to be handled by other personnel within the company, those persons must be under the permittee's supervision and must be aware of and able to adhere to all stipulations in this agreement.

This compliance agreement may be amended as necessary by USDA, APHIS, PPQ. HWS will be notified of all amendments.

> **NOTE:** "Any person who knowingly violates the Plant Protection Act (PPA) (7 U.S.C. §§ 7701 et. Seq.) And/or the Animal Health Protection Act (AHPA) (7 U.S.C. §§ 8301 et. Seq.) may be criminally prosecuted and found guilty of a misdemeanor which can result in penalties, and one year prison term, or both. Additionally, any person violating

the PPA and/or the AHPA may be assessed civil penalties of up to $250,000 per violation or twice the gross gain or gross loss for any violation that results in the person deriving pecuniary gain or causing pecuniary loss to another, whichever is greater."

WITHDRAWAL OF COMPLIANCE AGREEMENT

This compliance agreement may be canceled, by a PPQ Officer orally or in writing, if such officer determines that the holder thereof has not complied with any of the conditions stated in this compliance agreement. If the cancellation is oral, the cancellation and the reasons for the cancellation will be confirmed in writing as promptly as circumstances allow. Any person whose compliance agreement has been canceled may appeal the decision in writing to USDA- APHIS- PPQ within ten (10) days after receiving the written notification of the withdrawal. The appeal must be directed to the State Plant Health Director of Washington. The appeal must state all of the facts and reasons upon which the person relies to show that the compliance agreement was wrongfully canceled. USDA-APHIS-PPQ shall grant or deny the appeal, in writing, stating the reasons for such decision, as promptly as circumstances allow. If there is a conflict as to any material fact, a hearing shall be held to resolve such conflict. Rules of practice concerning such a hearing will be adopted by USDA-APHIS-PPQ.

Agreement

By signing this agreement, the primary holder of Hawaiian Waste Systems, LLC agrees to maintain the scope and intention of this compliance agreement. The signature further certifies that the listed business has met or will meet the requirements of all other applicable environmental authorities prior to the processing of any USDA, APHIS, PPQ Garbage and Regulated (domestic) Garbage.

This agreement may be immediately canceled or revoked for noncompliance.

I have read and understand the conditions of this compliance agreement.

<table>
<tr><td>6.Signature
□</td><td colspan="2">7. Title</td><td>8. Date Signed</td></tr>
<tr><td colspan="4">The affixing of the signatures below will validate this agreement, which shall remain in effect until canceled, but may be revised as necessary or revoked for noncompliance.</td></tr>
<tr><td colspan="2">10. Date of Agreement</td><td colspan="2">11. Agreement Number</td></tr>
<tr><td colspan="2">PPQ OFFICIAL (Name and Title)

Signature</td><td colspan="2">ADDRESS</td></tr>
<tr><td colspan="2">STATE AGENCY OFFICIAL (Name and Title)</td><td colspan="2">ADDRESS</td></tr>
</table>

Signature	

PPQ FORM 519
(FEB 2002)

Appendix B. Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. All marine mammals are protected under the MMPA.

Hawaii's Marine Mammals:

(From http://www.konawhalewatch.com/main_file.php/general/27/ *last accessed* June 13, 2006)

Baird's Beaked Whale
(*Berardius bairdii*) family: Ziphiidae

Blainville's Beaked Whale
(*Mesoplodon densirostris*) family: Ziphiidae

Bryde's Whale
(*Balaenoptera edeni*) family: Balaenopteridae

Cuvier's Beaked Whale
(*Ziphius cavirostris*) family: Ziphiidae

Dwarf Sperm Whale
(*Kogia simus*) family: Physeteridae

False Killer Whale
(*Pseudorca crassidens*) family: Delphinidae

Fin Whale
(*Balaenoptera physalus*) family: Balaenopteridae

Humpback Whale
(*Megaptera novaeangliae*) family: Balaenopteridae

Killer Whale
(*Orcinus orca*) family: Delphinidae

Melon-headed Whale
(*Peponocephala electra*) family: Delphinidae

Minke Whale
(*Balaenoptera acutorostrata*) family: Balaenopteridae

Northern Right Whale
(*Eubalaena glcialis*) family: Balaenidae

Pacific Bottlenose Dolphin
(*Tursiops gilli*) family: Delphinidae

Pygmy Killer Whale
(*Feresa attenuata*) family: Delphinidae

Pygmy Sperm Whale
(*Kogia breviceps*) family: Physeteridae

Risso's Dolphin
(*Grampus griseus*) family: Delphinidae

Rough-toothed Dolphin
(*Steno bredanensis*) family: Delphinidae

Short-finned Pilot Whale
(*Globicephala macrorhynchus*) family: Delphinidae

Sperm Whale
(*Physeter macrocephalus*) family: Physeteridae

Spinner Dolphin
(*Stenella longirostris*) family: Delphinidae

Spotted Dolphin
(*Stenella attenuata*) family: Delphinidae

Striped Dolphin
(*Stenella coeruleoalba*) suborder: Odonticeti family: Delphinidae

Hawaiian Monk Seal (From: http://www.earthtrust.org/wlcurric/seals.html *last accessed* June 13, 2006)
(*Monachus schauinslandi*) family: Phocidae

Washington's Marine Mammals

(From
http://www.washington.edu/burkemuseum/collections/mammalogy/mamwash/mamwash.html#cetacea *last accessed* June 13, 2006)

Northern Right Whale,
(*Eubalaena glacialis*) family: Balaenidae

Minke Whale
(*Balaenoptera acutorostrata*) family: Balaenopteridae

Sei Whale
(*Balaenoptera borealis*) family: Balaenopteridae

Blue Whale
(*Balaenoptera musculus*) family: Balaenopteridae

Fin Whale
(*Balaenoptera physalus*) family: Balaenopteridae

Humpback Whale
(*Megaptera novaeangliae*) family: Balaenopteridae

Gray Whale
(*Eschrictius robustus*) family: Eschrichtidae

Short-Beaked Saddleback Dolphin
(*Delphinus delphis*) family: Delphinidae

Short-finned Pilot Whale
(*Globicephala macrorhynchus*) family: Delphinidae

Risso's Dolphin
(*Grampus griseus*) family: Delphinidae

Pacific White-sided Dolphin
(*Lagenorhynchus obliquidens*) family: Delphinidae

Northern Right-Whale Dolphin
(*Lissodelphis borealis*) family: Delphinidae

Killer Whale
(*Orcinus orca*) family: Delphinidae

False Killer Whale

(*Pseudorca crassidens*) family: Delphinidae

Striped Dolphin
(*Stenella coeruleoalba*) family: Delphinidae

Rough-toothed Dolphin
(*Steno bredanensis*) family: Delphinidae

Bottle-nosed Dolphin
(*Tursiops truncates*) family: Delphinidae

Pygmy Sperm Whale
(*Kogia breviceps*) family: Kogiidae

Dwarf Sperm Whale
(*Kogia sima*) family: Kogiidae

Harbor Porpoise
(*Phocoena phocoena*) family: Phocoenidae

Dall's Porpoise
(*Phocoenoides dalli*) family: Phocoenidae

Sperm Whale
(*Physeter macrocephalus*) family: Physeteridae

Baird's Beaked Whale
(*Berardius bairdii*) family: Ziphiidae

Hubbs Beaked Whale
(*Mesoplodon carlhubbsi*) family: Ziphiidae

Pacific Beaked Whale
(*Mesoplodon stejnegeri*) family: Ziphiidae

Cuvier's Beaked Whale
(*Ziphius cavirostris*) family: Ziphiidae

Sea Otter
(*Enhydra lutris*) family: Mustelidae

Northern Fur Seal
(*Callorhinus ursinus*) family: Otariidae

Steller Sea Lion
(*Eumetopias jubatus*) family: Otariidae

California Sea Lion
(*Zalophus californianus*) family: Otariidae

Northern Elephant Seal
(*Mirounga angustirostris*) family: Phocidae

Harbor Seal
(*Phoca vitulina*) family: Phocidae

Oregon's Marine Mammals

(From http://www.mammalsociety.org/statelists/ormammals.html *last accessed* June 13, 2006)

Black Right Whale,
(*Eubalaena glacialis*) family: Balaenidae

Minke Whale
(*Balaenoptera acutorostrata*) family: Balaenopteridae

Sei Whale
(*Balaenoptera borealis*) family: Balaenopteridae

Blue Whale
(*Balaenoptera musculus*) family: Balaenopteridae

Fin Whale
(*Balaenoptera physalus*) family: Balaenopteridae

Humpback Whale
(*Megaptera novaeangliae*) family: Balaenopteridae

Gray Whale
(*Eschrictius robustus*) family: Eschrichtidae

Sperm Whale
(*Physeter macrocephalus*) family: Physeteridae

Pygmy Sperm Whale
(*Kogia breviceps*) family: Kogiidae

Baird's Beaked Whale
(*Berardius bairdii*) family: Ziphiidae

Pacific Beaked Whale
(*Mesoplodon stejnegeri*) family: Ziphiidae

Cuvier's Beaked Whale
(*Ziphius cavirostris*) family: Ziphiidae

Pacific Striped Dolphin
(*Lagenorhynchus obliquidens*) family: Delphinidae

Dall Porpoise
(*Phocoenoides dalli*) family: Delphinidae

Harbor Porpoise
(*Phocoena phocoena*) family: Delphinidae

Pilot Whale,
(*Globicephala macrorhynchus*) family: Delphinidae

Killer Whale
(*Orcinus orca*) family: Delphinidae

Rough-toothed Porpoise
(*Steno bredanensis*) family: Delphinidae

Northern Right Whale Dolphin
(*Lissodelphis borealis*) family: Delphinidae

False Killer Whale
(*Pseudorca crassidens*) family: Delphinidae

Risso's Dolphin
(*Grampus griseus*) family: Delphinidae

Northern Fur Seal
(*Callorhinus ursinus*) family: Otariidae

Steller Sea Lion
(*Eumetopias jubatus*) family: Otariidae

California Sea Lion
(*Zalophus californianus*) family: Otariidae

Northern Elephant Seal
(*Mirounga angustirostris*) family: Phocidae

Harbor Seal

(*Phoca vitulina*) family: Phocidae

Sea Otter
(*Enhydra lutris*) family: Mustelidae

California's Marine Mammals (within program action area)

(From http://www.dfg.ca.gov/Mrd/mambk_a.pdf *last accessed* June 13, 2006)

Northern Right Whale,
(*Eubalaena glacialis*) family: Balaenidae

Minke Whale
(*Balaenoptera acutorostrata*) family: Balaenopteridae

Sei Whale
(*Balaenoptera borealis*) family: Balaenopteridae

Blue Whale
(*Balaenoptera musculus*) family: Balaenopteridae

Fin Whale
(*Balaenoptera physalus*) family: Balaenopteridae

Humpback Whale
(*Megaptera novaeangliae*) family: Balaenopteridae

Gray Whale
(*Eschrictius robustus*) family: Eschrichtidae

Short-Beaked Saddleback Dolphin
(*Delphinus delphis*) family: Delphinidae

Short-finned Pilot Whale
(*Globicephala macrorhynchus*) family: Delphinidae

Risso's Dolphin
(*Grampus griseus*) family: Delphinidae

Pacific White-sided Dolphin
(*Lagenorhynchus obliquidens*) family: Delphinidae

Northern Right-Whale Dolphin
(*Lissodelphis borealis*) family: Delphinidae

Killer Whale
(*Orcinus orca*) family: Delphinidae

Harbor Porpoise
(*Phocoena phocoena*) family: Phocoenidae

Dall's Porpoise
(*Phocoenoides dalli*) family: Phocoenidae

False Killer Whale
(*Pseudorca crassidens*) family: Delphinidae

Striped Dolphin
(*Stenella coeruleoalba*) family: Delphinidae

Rough-toothed Dolphin
(*Steno bredanensis*) family: Delphinidae

Bottle-nosed Dolphin
(*Tursiops truncates*) family: Delphinidae

Pygmy Sperm Whale
(*Kogia breviceps*) family: Kogiidae

Dwarf Sperm Whale
(*Kogia sima*) family: Kogiidae

Sperm Whale
(*Physeter macrocephalus*) family: Physeteridae

Baird's Beaked Whale
(*Berardius bairdii*) family: Ziphiidae

Hubbs Beaked Whale
(*Mesoplodon carlhubbsi*) family: Ziphiidae

Cuvier's Beaked Whale
(*Ziphius cavirostris*) family: Ziphiidae

Northern Fur Seal
(*Callorhinus ursinus*) family: Otariidae

Steller Sea Lion
(*Eumetopias jubatus*) family: Otariidae

California Sea Lion
(*Zalophus californianus*) family: Otariidae

Northern Elephant Seal
(*Mirounga angustirostris*) family: Phocidae

Harbor Seal
(*Phoca vitulina*) family: Phocidae

Sea Otter
(*Enhydra lutris*) family: Mustelidae

Assessment:

These species could be harassed by the operation of towing vessels during barge movement. The physical presence of tugs and barges could lead to disturbance of marine mammals by visual or other cues. Marine debris could be generated if integrity of bales is not maintained.

The potential for collisions between the tug/barge and marine mammals is very low due to the slow tow speed (6-9 knots). Noise or visual disturbance will not likely occur since marine mammals have demonstrated little behavioral reaction to slow-moving vessels, according to surveys conducted (NMFS, 2006). The baled garbage will be inspected at multiple points in the transport process to ensure that bales are intact and garbage will not be released. Therefore, implementation of the proposed action is expected to be protective of marine mammals within the action area.

Reference:

United States Department of Commerce. 2006. National Marine Fisheries Service. Small takes of marine mammals incidental to specified activities; movement of barges through the Beaufort Sea between West Dock and Cape Simpson or Point Lonely, Alaska. Federal Register, Vol. 71, p34064, June 13, 2006.

Appendix C. Risk of Introduction of Pests to the Continental United States via Municipal Solid Waste from Hawaii.

United States
Department of
Agriculture

Animal and Plant
Health Inspection
Service

March 2006
Updated August 2006

The Risk of Introduction of Pests to the Continental United States via Plastic-Baled Municipal Solid Waste from Hawaii

Executive Summary

Companies have proposed transporting large volumes of Hawaiian municipal solid waste (MSW) in airtight bales to landfills in the continental United States. The bales are created by shredding, compressing, and wrapping MSW in adhesive-backed, plastic film barriers. Airtight enclosure from creation to burial would mitigate plant pest risks, but this technology is still relatively new. Moreover, federal regulations prohibit garbage from Hawaii from entering the continental United States. Thus, the Center for Plant Health Science and Technology (CPHST) was asked to assess the risks of plant pest establishment via this pathway. Specifically, we assessed the soundness of baling technology and the safety of the general pathway, considering here those processes likely to apply to all company proposals. We also did a generic quantitative analysis of the likelihood of bale-rupturing accidents via the different conveyances: trucks, trains, and barges. Some proposal-specific parameters, such as the locations of landfills on the mainland and the types of transport to be used, will be evaluated separately for each particular proposal to identify any exceptionally significant risk factors.

Published, independent scientific testing of the baling technology confirmed manufacturers' specifications and indicated that it is likely to mitigate the risk from all types of plant pests. In particular, insects, mollusks, and some pathogens are unlikely to survive in the bales because of compression, anoxia, and the absence of hosts. Other procedures, such as bale construction, monitoring during transport, and burial in regulated landfills, should adequately protect against escapes from within bales via accidental ruptures and punctures during handling and transport. Compliance with general procedures, such as diversion of yard and agricultural waste, and proper staging and prompt shipment of bales, is also important. The accident rate analysis indicated a very low likelihood of bale-rupturing accidents for all conveyances. If these procedures are followed, transporting municipal solid waste from Hawaiian cities in bales poses an insignificant risk of plant pest introduction. In addition, we recommend that the pathway be monitored to ensure that pathway processes and compliance do not differ significantly from proposals evaluated here.

Table of Contents

I. Introduction

Companies have proposed transporting up to 300,000 tons (lbs) of baled municipal solid waste (MSW) per year from Hawaii to landfills in the continental United States. Bales will be created by compressing and wrapping MSW in adhesive-backed, plastic film barriers made of low density polyethylene (LDPE), creating airtight packages. Bales would be transported by barge to the mainland and then perhaps by other means to landfills, and ultimately buried intact, in accordance with regulations for solid waste disposal (40CFR§258; EPA (1993)). Garbage from Hawaii is not enterable under current federal regulations for plant pests (7CFR§330.400). Therefore, an assessment of the risks of plant pest introduction via baled Hawaiian MSW to the continental United States is needed. At the request of the State of Hawaii, this assessment was done by the Center for Plant Health Science and Technology (CPHST), part of the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA).

The objective of this report is to evaluate whether the baling technology will effectively mitigate potential plant pest risks associated with MSW from Hawaii. The assessment focuses upon the planned use of the baling technology, because airtight enclosure from creation to burial would mitigate the risks of establishment by any plant pests (Appendix A). We address the following three questions:

1) Does the baling technology provide a strong, airtight barrier?
2) How likely are bale-rupturing accidents for barges, trucks, and trains during transport?
3) How likely are punctures? and
4) Will general pathway procedures reduce pest incidence in the bales and the chances of escape in the event of accidental ruptures or punctures?

In addition, we give qualitative risk ratings for different pest types based on the likelihood of introduction. Only those pathway processes likely to be common to all company proposals to transport baled Hawaiian waste were considered. Separate assessments for particular company proposals will address factors such as the destination landfill, type of transportation to be used on the mainland, and pest species that may pose particular threats.

II. Definitions

Garbage is defined as urban (commercial and residential) solid waste from municipalities on any Hawaiian island, such as Honolulu on Oahu, and Hilo on Hawaii. Based on company proposals to move baled waste (not shown), this analysis assumed that yard and agricultural waste will be excluded from the waste stream. Therefore, the volume of any such waste accidentally entering the pathway should be minimal. If it was found that yard and agricultural waste was not typically excluded, a revised assessment might be necessary.

A spill is defined as the escape of waste material from a bale and contact with the surrounding environment, e.g. ground, truck, tractor, barge, or other terrestrial features.

Other important terms are defined as follows (Merriam-Webster, 2004):

Anoxia: hypoxia especially of such severity as to result in permanent damage
Anoxic: greatly deficient in oxygen
Hypoxia: a deficiency of oxygen in organisms/bodily tissues

Anaerobic means living, active, occurring, or existing in the absence of free oxygen. Thus, the term anaerobic is only correctly applied to organisms, not non-living things like bales, or the conditions within them.

III. Detailed overview

Some details will be specific to each company proposal, such as the landfill site and means of transport within the continental U.S., but general characteristics related to the pathway include the following:

1) The material to be transported is municipal solid waste
2) Agricultural and yard waste will be diverted to other transfer stations and waste streams, and actively removed at some processing centers; only incidental amounts of yard waste are likely to enter the waste baling process
3) A baling system will be used to create high-density bales (ca. 1000 pounds per cubic yard) wrapped with at least four layers of adhesive-backed plastic
4) The shape and weight of the bales depends on the technology used but rectangular bales with weights from 2 to 12 tons might be expected
5) Bales will be stored, or 'staged,' for a short time—e.g., five days (Pacific Rim Environmental Resources, 2004)—before transport to allow bales to become anoxic
6) Manifested bales will be moved on barges to the mainland, a trip of about 12 to 18 days
7) Bales will eventually be unloaded and moved by truck or by rail to a landfill
8) In procedures likely to be specified in compliance agreements, companies will monitor bales to detect ruptures and punctures during transport, with particular regard for handling operations (loading and unloading)
9) Landfilled bales will be covered with at least six inches of soil within 24 hours (EPA, 1993)
10) Landfilled bales will ultimately be covered by at least seven feet of material if placed on the top (final) waste layer, but many more feet if placed closer to the bottom layer

Other important points include the following:

- Hazardous and liquid wastes will be diverted or removed before shredding and baling
- Waste and bales will not contact soil after collection or wrapping (i.e., stored on asphalt, concrete, etc)
- Imperfectly sealed bales found during staging in Hawaii will be rewrapped and re-staged
- Fewer ruptures of bales seem likely to occur with tractors that have grabbing rather than forked lift arms (Figure 1)
- Companies will deal appropriately with punctures and small ruptures detected after shipment
- Companies will handle larger ruptures by collecting spilled waste, storing all waste in sealed containers, and rewrapping and re-staging waste
- Spills will be cleaned up and disinfected according to USDA guidelines for spills of international garbage (PPQ, 2004)
- All ruptures and punctures will be documented and reported regularly to PPQ and State officials
- Destination landfills will be modern facilities that meet all regulations for design and operation (e.g., EPA, 1993)

Finally, we presumed here that after creation, bales will only be moved once into staging, and then once again onto barges bound for the mainland. (Of course, bales will once again be handled on the mainland.) Additional handling in Hawaii, for instance to transport bales from other islands to a central location for staging and barge loading, would increase the risk of punctures and ruptures.

Figure 1. Example tractor with 'grabbing' lift arms for handling bales.

IV. Validity of the baling technology

Although sizes and shapes of bales depend on the exact technology used, bale creation processes and specifications are similar across different manufacturers (e.g., DEKRA (1996), Roll Press Pack International, Ltd. (2004), RPP America (2004), and Cross Wrap (2004)). Information from manufacturers (e.g., DEKRA, 1996) was corroborated by independent research (see below). During the baling process waste material is shredded if necessary, compressed to a high density, wrapped with bands or netting to maintain shape (Fig. 2), and then wrapped with adhesive-coated LDPE. At least four layers of plastic are used, forming a strong, airtight barrier (Appendix A). Bale shape depends on the process, with cylinders created in "roll-press" systems and rectangles created in ramming systems (e.g., Baldasano et al., 2003). Roll-press systems tend to result in bales with less trapped air (Sieger and Kewitz, 1997). The degree of compression is typically greater with rectangular bales, and more liquid is pressed out as well. Bale densities are expected to be in the range of 800 to 1100 kg/m^3 (ca. 1300 to 1800 lbs/yd^3) (Baldasano et al., 2003).

The bales become anoxic within a few days after wrapping (Paillat and Gaillard, 2001; Robles-Martinez and Gourdon, 1999). The O_2 concentration of normal air is 21 percent (21 kPa), but concentrations in bales were near 2 percent (ca. 2 kPa). Because of that and other factors, very little biodegradation or production of gases occurs.

The wrapping is strong as well as airtight. According to Baldasano et al. (2003), the LDPE "…has a high, although not total, degree of resistance to perforation and tearing." Pre-stretching helps maintain bale shape, increases adhesion, and helps prevent ruptures. Bales weighing less than 1000 kg did not rupture when dropped from a height of 3 m (DEKRA, 1996). A user in Utah reported that bales larger than 1000 kg rupture when dropped 3.1 to 7.6 m (10 to 25 ft) onto the vertical sides of railroad cars (pers. comm., Barry Edwards, North Pointe Waste Transfer Station, Lindon, UT). USDA will not allow Hawaiian baled MSW to be handled that way. Pointed or sharp objects within the bales might perforate the plastic (Baldasano et al., 2003) but we found no indication that this has commonly occurred, and compression would reduce that possibility.

Under normal storage conditions, the bales typically remain airtight for many months (Robles-Martinez and Gourdon, 2000). LDPE film degrades over time when exposed to sunlight. The plastic film used in this baling process is expected to remain effective for at least 100 days (Paillat and Gaillard, 2001) and possibly for up to 12 months (Baldasano et al., 2003) in direct sunlight. The combined storage and transit time from Hawaii to the mainland is unlikely to exceed 100 days (see below).

The adhesive-backing provides the plastic film with a self-sealing capability: small ruptures (size unspecified) tend to become airtight again (Paillat and Gaillard, 2001). That, and the density of the waste itself, should help mitigate the chance of material escaping through punctures and small ruptures but cannot be relied upon exclusively. The plastic or metal netting used in some baling technologies to maintain shape would also limit the chance of waste and plant pests escaping through ruptures but the rectangular bale system apparently uses straps rather than netting.

Overall, the waste baling technologies using adhesive-backed plastics seem very sound, creating strong, airtight bales that can be safely handled, stored, and transported.

Figure 2. A representative high-density bale of compacted solid waste, ready to be wrapped in adhesive-backed plastic.

V. Potential plant pests

Specific pests are not discussed here because the species of interest will depend upon the destination, and because the baling technology will be universally effective against all types of pests if bales remain airtight. Lists of selected Hawaiian insects, pathogens, and pest plants of quarantine concern for the contiguous 48 states are given in Appendix A. Those lists include both plant pests and other pests that pose human health risks (e.g., cockroaches).

VI. Pest risk mitigations

Mitigations considered here either result from the baling technology itself or features of the proposed pathway, including the waste type, and how bales are staged, handled, transported, and buried.

Mitigations from the baling technology

Bales that remain airtight from creation until burial completely mitigate the risk from all plant pests because the pests and pest propagules cannot escape. That mitigation is universal, i.e. it does not depend on pest type or taxonomy, and probably applies equally to both current and future pests that establish in Hawaii. Because of the possibility of accidental ruptures or punctures, however, we also consider pest mortality and the effects of other pathway factors.

Given that achieved bale densities should be about 1000 kg/m^3, compaction would likely kill most insects, regardless of stage (see Montgomery and Manning, 2004). This would therefore greatly reduce the possibility of boring-type insects chewing through the plastic wrapping, which, moreover, would only be possible if those insects ended up on the outermost surface of the compacted waste. In addition, compaction ensures no whole fruit will enter bales. Compaction may also neutralize some weed seeds and nematodes, but at a greatly reduced rate than for other organism types. Shredding will have some mitigative effects if done, but that would depend on the technology used and the pest organism type.

Anoxia would kill any insects and insect propagules or mollusks that remain viable in the bales, probably within a few days (Hinton, 1981; Hoback and Stanley, 2001; Montgomery and Manning, 2004; Navarro and Donahaye, 2005; Robinson, 2006; Woods and Hill, 2004). This idea has been used for centuries for pest-free food storage (e.g., De Lima, 1990). Concentrations of less than 3 percent O_2 provide control, while concentrations of less than 1 percent provide rapid control (Navarro and Donahaye, 2005). Adults and eggs of insects are probably most sensitive to hypoxia (Hoback and Stanley, 2001). Insect and mollusk mortality is important because, of the pest organisms considered here, only those actively disperse.

Anoxia by itself would not kill most weed seeds (Paillat and Gaillard, 2001). Some pathogens would be killed by persistent anoxia, such as some bacteria and nematodes, but many others could be unaffected (L.M. Ferguson, 2005, CPHST, pers. commun.,).

Mitigation from pathway procedures

Waste stream. For MSW in the United States, paper is the single largest component at 35 percent, on average, while inorganic components (e.g., plastic, glass) make up an additional 32 percent (EPA, 2005). Food waste and yard trimming each make up 12 percent, and wood makes up 6 percent of the waste stream. Exclusion of yard and agricultural waste from the baling waste stream in Hawaii should reduce the number of potential pests and pest propagules in this pathway to very low levels. Green recycling operations in urban areas (e.g., Refuse Division, 2006) that separate the collection and processing of yard and agricultural waste from general MSW may also help reduce the chance of waste contamination. Regulated plant pests or pest propagules are likely to only be present in an extremely small proportion of any baled yard waste.

On Oahu, the MSW most likely to be diverted to baling and transport is raw MSW going to Waimanalo Gulch landfill, which has a mean of 6.0 percent yard waste (± 3.4 percent) (R. M. Towill Corporation, 1999). Likewise, MSW on Hawaii has a mean percentage of yard waste of 5.4 percent (M. Dworsky, County of Hawaii, 2006, pers. commun. to D. Alontaga). By comparison, the yard waste fraction in residential MSW on Oahu—which is very unlikely to enter the baling process—is almost 30 percent (R. M. Towill Corporation, 1999). Companies plan to further screen and remove visible yard waste in transfer stations or on bale processing lines. If those procedures were 50 percent effective, they would reduce the fraction of yard waste in baled Hawaiian MSW from 6 percent to 3 percent or less. Screening and exclusion is likely to be made more effective because most yard waste in MSW will be clumped (e.g., bags of grass clippings or leaves). As the proportion of yard waste decreases, removal will become increasingly difficult. Given the mitigations from baling and other pathway factors, we think these incidental amounts probably still represent a Low risk of plant pest introduction.

Staging. The minimum staging plus transport time is about 15 days, which is more than enough time for the bales to become anoxic. The maximum staging plus trip time is unknown. We recommend a waiting period before transport of less than 75 days to avoid nearing the 100-day period for the earliest possible degradation by sunlight.

During staging, bales might become contaminated with hitchhiking plant pests, and mollusks in particular (Robinson, 2006). For example, plastic-wrapped pallets of stone and tiles from Italy that are left in fields before shipping have often become contaminated with snails and slugs (USDA-APHIS-PPQ, 2005). The requirement that bales not contact soil should reduce the risk of contamination. Still, we strongly recommend that the two following precautions also be taken: 1) that bales be staged or stored as far from vegetation and pavement borders as possible, and 2) that bales be certified as snail- and slug-free before shipment (details to be specified in compliance agreements).

Handling. Ruptures and punctures of bales are most likely to occur during loading and unloading; moving accidents will probably be rare. These rates are as yet unknown. Punctures seem very unlikely to occur if tractors have grabbing lift arms rather than forks. Bales may rupture if dropped from heights of 3 m or more; that depends upon bale weight and shape and other factors. Using tractors like that in Fig. 1 will greatly reduce the risk of drops from significant heights—because bales are clamped during movement rather than balanced on forks—even if bales are occasionally stacked 3 m high or more, such as might happen during staging.

Monitoring. Companies will likely be required to monitor bales for two things: 1) punctures and ruptures, and 2) the presence of hitchhiking snail and slug pests before bales depart for the mainland (above). If bales are to be certified mollusk-free, responsible parties will need to be specified in compliance agreements. Ruptures are likely to be detected, since they will probably result from drops, and we expect any dropped bales to be inspected carefully at the time. Punctures are less likely to be detected but are much less likely to occur if grabbing-type lift arms are used, and are most likely to self-seal (see above). All compliance will be monitored by PPQ and/or State personnel.

Transport on the mainland. See Section (VII) below.

Clean up. Bale density, binding materials, and the self-sealing ability of the LDPE should all limit the amount of escaping material. Most weed seeds and plant pathogens will have little or no ability to disperse after a spill. One exception may be spores which are small enough for wind-dispersal. Pathogens dispersing to a susceptible host, or invasive plant seeds dispersing to a suitable site for growth are highly unlikely, assuming clean-up procedures are followed scrupulously. Thorough cleaning should capture nearly all waste material, and proper use of approved disinfectants (PPQ, 2004) will likely control any escaped pathogens.

Landfilling. Because of monitoring, bale-handling technologies, and the low number of times bales will be handled, only airtight bales are likely to enter the landfill. If the handling equipment used in the landfills is similar to that used previously, ruptures during placement will be unlikely. Covering with a 6-inch barrier of soil or other material (see 40CFR§258.21) within 24 hours will further mitigate the possibility of dispersal of plant pests or propagules, by both natural and vector-caused means. Baled waste is unlikely to be attractive to vectors because of its composition, appearance, and the lack of odorous biodegradation (above). Most proposals specify that bales will be landfilled separately from other waste ("monofilled"); this means bales will not be subjected to compacting of regular, loose MSW by tractors. Ultimately, landfilled bales will be covered with from seven to dozens of feet of materials (see 40 CFR §258.60), depending upon the layer in which they are placed. In addition, the final cover has water-impermeable layers (EPA, 1993).

VII. Risk of bale-rupturing accidents

Model development and parameterization

We estimated the annual accident rates for trucks, trains, and barges, and years to the first bale-rupturing accident for each, in a probabilistic model (Appendix B). We did this for generic but realistic travel distances of 25 miles by truck, 500 miles by rail, and 140 miles by barge on the Columbia River. From the number of 3.3-ton bales required to transport 300,000 tons of MSW, and the number of bales per truck (25 ton capacity, 7 bales per truck on average), barge (10,000 ton capacity, ca. 2,900 bales per barge), and train (ca. 2900 bales), we calculated the annual number of trips required, total vehicle miles traveled (VMT), and, for barges, annual ton-miles (the product of tons and distance transported). Importantly, not every accident would rupture bales. For trucks, for example, fender-benders would not represent a risk for bale ruptures, while rollovers would. Thus we assumed that only bales ejected from the conveyance would be likely to rupture.

Truck. The mean national accident rate for trucks was 1.96 per million VMT (2000 to 2004) (Analysis Division, 2006; Federal Motor Carrier Safety Administration, 2004). The fraction of those relevant to the transportation of baled MSW—accidents to flat bed trailers moving intrastate—was about 1.5 percent . The fraction of accidents that released some cargo was 0.325 for flatbed trucks (1991 to 2000: Craft, 2004).

Train. For the period from 1996 to 2005, the mean accident rate for trains was 3.94 per million VMT (all rail modes: Office of Safety Analysis, 2006). The fraction of those accidents relevant to baled MSW was the product of the proportion that occurred on main lines (i.e., greater speed), about 0.55, and the proportion of those that occurred to freight trains, about 0.47 (e.g., Federal Railroad Administration, 2005b). Finally, data from the same source on the proportions of accidents in which hazardous materials were released for 2000 to 2004 indicated that the mean likelihood for a cargo spill (i.e., bale rupture) was 0.039 (3.9 percent).

Barge. The average haul distance for the Columbia River of 140 miles was estimated directly from freight transport data (e.g., U.S. Army Corps of Engineers, 2003): that distance approximated the average known distances that bales will likely be moved by transport companies. For the most recent available data, the number of accidents on the Columbia River was 80 in 2000 and 87 in 2001 (Marine Safety Offices, 2006). Accounting for the amount of freight moved (U.S. Army Corps of Engineers, 2002, 2003) gave a mean accident rate for barges of 28.3 per billion ton-miles [a ton-mile is the product of the mass and distance moved]. Of those, only 4 of the 167 accidents (2.4 percent) on the Columbia River involved freight barges (Marine Safety Offices, 2006). The mean fraction of accidents that might cause bales to rupture was 0.11, estimated from the number accidents involving hazardous materials which resulted in releases (spills) from 1990 to 1997 (Office of Hazardous Materials Safety, 1999).

Results and discussion

Using the above parameter estimates in a probabilistic model (@Risk version 4.5.4 - Professional Edition, Palisade Corporation, Ithaca, NY), we estimated that the annual likelihood of a bale-rupturing accident was 0.0035 for trucks, 0.0007 for trains, and 0.0029 for barges. The corresponding mean time to first bale-rupturing accident was 285 yr for trucks, 344 yr for barges, and more than 1,400 yr for trains (Fig. 3). We found a 95 percent chance that the first bale-rupturing accident would occur only after 15 yr for trucks, after 18 yr for barges, and after 74 yr for trains.

Reductions in trip distance below 25 miles for trucks, 500 miles for trains, or 140 miles for barges would decrease the likelihood of bale-rupturing accidents. For example, the distance from the off-loading point to the landfill in Roosevelt, WA, is only 8 miles, meaning the risk of a truck accident for that particular pathway would likely be about two-thirds less. Similarly, accident rates would be proportionate to the total amount of MSW transported, so accident rates would be somewhat less at the start of operations until the capacity increased. Typically, proposals to move baled MSW from Hawaii use only two of the three conveyance types.

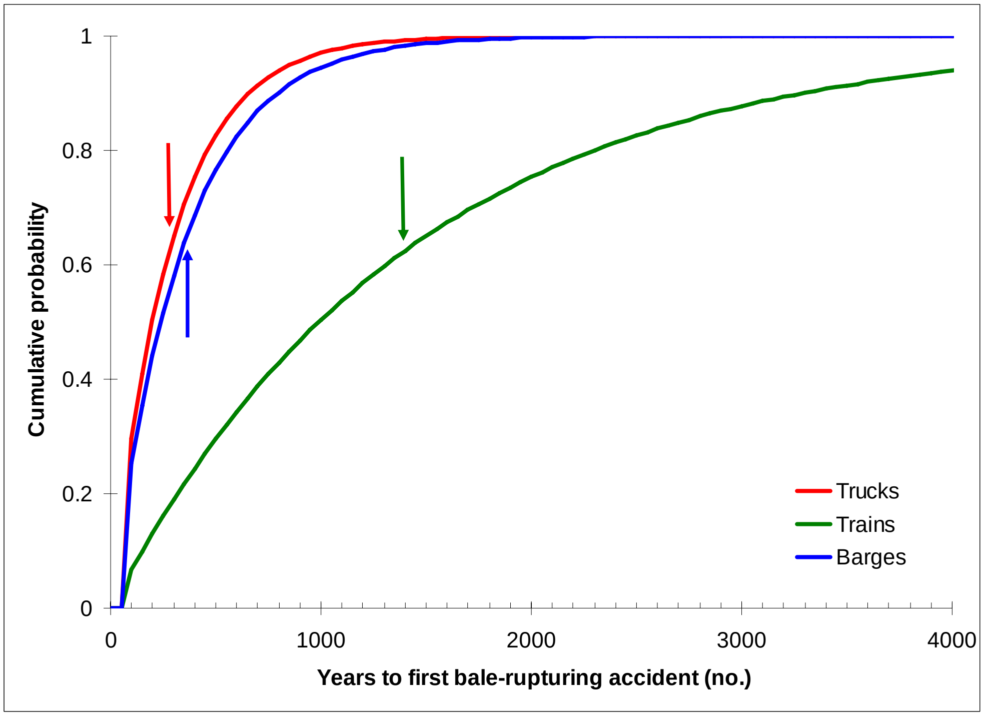

Figure 3. Model results for years to first bale-rupturing via three types of conveyances. Arrows indicate mean values of the output distributions.

VIII. Qualitative risk assessment

The baling technology is sound and should ensure that MSW is shipped only in strong, airtight bales. Compaction and the use of the baling technology may not kill seeds of invasive plants or some types of plant pathogens but makes their escape extremely unlikely. It especially mitigates against insect pests because of anoxia-induced mortality within a few days. Pathogens and seeds of invasive plants cannot actively disperse and except for significant ruptures would have little chance of escaping and coming into contact with acceptable hosts or suitable growth sites. Because of the structure of the bales, only catastrophic ruptures—which should always be detected—might facilitate significant dispersal of pests or pest propagules. The handling procedures, strength of the plastic wrapping and strapping materials, and the probable small accident rate for final transport to the landfill (above) reduce the likelihood of ruptures. Other procedures, such as patching or re-wrapping bales, cleanup and disinfection, and restaging bales will provide further mitigation.

We qualitatively assessed the likelihood of introduction for general pest classes of insects, pathogens, and pest plants (invasive plants and weeds). We followed the PPQ guidelines for conducting pathway-initiated risk assessments (PPQ, 2000), and modified them where appropriate. Some subelements were removed because they did not apply to this pathway, and totals were revised accordingly. Only the general pest classes of insects, mollusks, pathogens, and pest plants (invasive plants and weeds) were scored, because the baling technology is so broadly effective, and the very small likelihood of introduction for any particular pest. For each subelement a score of either none = 0, low = 1, moderate = 2, or high = 3, was given. Values of zero are not usually possible but were reasonable here because of the potential effectiveness of the technology. Cumulative risk rating intervals were Low = 0 to 6, Moderate = 7 to 9, and High = 10 to 12 (after PPQ, 2000).

The likelihood of introduction of plant pests inside bales of MSW was least for insects and mollusks (score = 1; Table 1), as expected due to mortality from anoxia. Cumulative ratings for pathogens and pest plants were greater because of the increased likelihood of survival inside the bales, but were still Low overall. Even if we assumed a moderate rate for accidental ruptures of bales, so that the likelihoods of pests dispersing and coming in contact with a suitable host or site were equal to 1, the overall risk estimates would still be Low (total = 6, for pathogens and weeds).

Lastly, we did not include hitchhiking mollusks in Table 1, because as contaminating pests they would not reside *in* the bales, but under the same scoring they would rate High risk (1 + 3 + 3 + 3 = 10). This highlights the need to properly stage bales and certify them as being mollusk-free before shipment (see above).

Table 1. Qualitative risk ratings for the likelihood of introduction into the continental United States for three pest types via Hawaiian municipal solid waste in airtight bales. Hitchhiking pests were not considered here (see text).

Pests	Risk subelements				Cumulative risk ratings
	1 Annual quantity imported	2 Survive baling and shipment	3 Moved to suitable habitat	4 Contact suitable host or site	
Insects	1[a]	0	0	0	1
Mollusks	1	0	0	0	1
Pathogens	1	2	2	0	5
Pest plants	1	2	2	0	5

[a] The total amount of baled municipal solid waste may be high, but the proportion of waste that might harbor plant pests is low.

IX. Conclusions

Transporting urban solid waste from Hawaiian cities to the continental United States in airtight bales poses a Low risk of pest introduction. That is because the baling technology mitigates the risk from all types of plant pests, and the other pathway procedures should adequately protect against accidental ruptures and punctures in bales during the handling and transport process and subsequent escapes of pests and pest propagules. We also recommend proper staging of bales and certifying them as mollusk-free to mitigate against contaminating pests. So long as those processes and the procedures proposed by the companies—including diversion of yard and agricultural waste, prompt shipment, monitoring and inspection of bales, and thorough clean up of any ruptures that do occur—are followed, establishment of Hawaiian plant pests via this pathway is highly unlikely. We recommend that this new pathway be monitored for some time to ensure that pathway procedures match those described here from proposals.

Lastly, only the plant pest risk associated with the pathway was addressed here. Although we concluded that the overall pest risk was Low, complete approval by USDA for the pathway or particular procedures should not be inferred. The pathway, in whole or in part, may still be subject to denial or modification based upon other constraints (pest or non-pest related), such as logistics, available resources, or other Federal regulations.

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Appendices

Appendix A. *Lists of selected Hawaiian pests, including insects, pathogens, and pest plants of quarantine significance to the continental United States. The lists focus on plant pests but also include other categories of pests, such as human health pests.*

Table A1. Selected exotic or quarantine-significant plant pests from Hawaii for the 48 contiguous states in the United States. NOTE: This is not a complete list of all quarantine-significant pests from Hawaii and should not be regarded as such.

Pest	Geographic Distribution[1]	References
INSECTA		
ACARI		
Tetranychidae		
Oligonychus biharensis (Hirst)	HI	Bolland, et al., 1998; CABI, 2004; Nishida, 2002
Oligonychus mangiferus (Rahman & Sapra)	HI	Bolland et al., 1998
BLATTODEA		
Blaberidae		
Diploptera punctata (Eschscholtz)	HI	Anon., 2005; Evans, 2004; Nishida, 2002
Blattellidae		
Blattella lituricollis (Walker)	HI	Anon., 2005; Evans, 2004; Nishida, 2002
Blattidae		
Neostylopyga rhombifolia (Stoll)	HI	Anon., 2005; Evans, 2004; Nishida, 2002
Platyzosteria soror (Brunner)	HI	Anon., 2005; Evans, 2004; Nishida, 2002
Polyphagidae		
Euthyrrhapha pacifica (Coquebert)	HI	Anon., 2005; Evans, 2004; Nishida, 2002
COLEOPTERA		
Anthribidae		
Exillis lepidus Jordan	HI	Swezy, 1950
Bostrichidae		
Sinoxylon conigerum Gerstaeker	HI	CABI, 2004; Nishida, 2002

Pest	Geographic Distribution[1]	References
Cerambycidae		
Ceresium unicolor (F.)	HI	Nishida, 2002
Coptops aedificator (F.)	HI	Bridwell, 1920
Lagocheirus sp.	HI, US	Nishida, 2002; USDA-APHIS-PPQ, 2005
Oopsis nutator (F.)	HI	Swezy, 1950
Sybra alternans (Wiedemann)	HI	Nishida, 2002; UH-CTAHR and HI-DoA, 2005; USDA-APHIS-PPQ, 2005
Chrysomelidae		
Metriona circumdata (Herbst)	HI	CABI, 2001; HI-DoA, 2002
Octotoma scabripennis Guerin-Meneville	HI	CABI, 2003; Nishida, 2002
Cucujidae		
Parandrita aenea (Sharp) (= *Laemophlaeus minutus* [Oliv.])	HI	Nishida, 2002
Curculionidae		
Elytroteinus subtruncatus (Fairmaire)	HI	UH-CTAHR and HI-DoA, 2005; USDA-APHIS-PPQ, 2002
Euscepes postfasciatus (Fairmaire)	HI, CA	HI-DoA, 2002; O'Brien and Wibmer, 1982
Dryophthorus distinguendus Perkins	HI	Swezy, 1950
Orchidophilus aterrimus (Waterhouse)	HI	Tenbrink and Hara, 1994a
Orchidophilus perigrinator (Buchanan)	HI	Tenbrink and Hara, 1994b
Oxydema fusiforme Wollaston	HI	Swezy, 1950
Nitidulidae		
Carpophilus oculatus Murray	HI	Ewing and Cline, 2005; Gillogly, 1962; Nishida, 2002
Epuraea munda (Sharp)	HI	Ewing and Cline, 2005
Epuraea ocularis Fairmaire (= *Haptoncus ocularis* [Fairmaire])	HI	Chûjô and Lee, 1994; Ewing and Cline, 2005; Nishida, 2002
Haptoncus ocularis (Fairmaire)	HI	Gillogly, 1962; Nishida, 2002

Pest	Geographic Distribution[1]	References
Phenolia attenuata (Reitter)	HI	Ewing and Cline, 2005
Phenolia limbata (F.)	HI	Ewing and Cline, 2005
Platypodidae		
Platypus cupulatus Chapuis	HI	Wood and Bright, 1992
Scarabaeidae		
Adoretus sinicus Burmeister	HI	CABI, 2004; Nishida, 2002; USDA-APHIS-PPQ, 2005
Protaetia fusca (Herbst)	HI	CABI, 2004; Nishida, 2002; USDA-APHIS-PPQ, 2005
Scolytidae		
Coccotrypes sp.	HI	USDA-APHIS-PPQ, 2005
Ericryphalus henshawi Hopkins	HI	Swezy, 1949
Ericryphalus sylvicola (Perkins)	HI	Swezy, 1950
Ericryphalus trypanoides Beeson	HI	Van Zwaluwenburg, 1956
Euwallacea fornicatus (Eichhoff)	HI	CABI 2004; Hill 1994; Nishida, 2002; UH-CTAHR and HI-DoA, 2005; Wood and Bright, 1992
Hypothenemus ruficeps Perkins	HI	Swezy, 1941
Xyleborus fornicatus Eichhoff	HI	Swezy, 1950
Xyleborus perforans (Wollaston)	HI	CABI, 2004
Xylosandrus morigerus (Blandford)	HI	CABI, 2004; Wood and Bright, 1992
DIPTERA		
Agromyzidae		
Liriomyza huidobrensis (Blanchard)	HI, CA	CABI, 2004; Nishida, 2002; USDA-APHIS-PPQ, 2005
Melanagromyza splendida Frick	HI	Frick, 1953
Ophiomyia phaseoli Tryon	HI	CABI, 2003; Hill, 1994; Nishida, 2002; Spencer and Steyskal, 1986

Pest	Geographic Distribution[1]	References
Lauxaniidae		
Homoneura hawaiiensis (Grimshaw)	HI	Hardy and Delfinado, 1980
Lonchaeidae		
Lamprolonchaea metatarsata (Kertész)	HI	Hardy and Delfinado, 1980
Muscidae		
Atherigona hendersoni Malloch	HI	Hardy, 1981
Otitidae		
Euxesta annonae (F.)	HI, FL	Steyskal, 1969; Stone et al., 1965
Euxesta wettsteini Hendel	HI	Hardy and Delfinado, 1980
Phoridae		
Puliciphora lucifera Dahl	HI	Hardy, 1964
Sciaridae		
Bradysia spatitergum (Hardy) (= *Sciara spatitergum* Hardy)	HI	Hardy, 1960; Nishida, 2002
Scatopsciara nigrita Hardy	HI	Hardy, 1960
Stratiomyidae		
Cephalochrysa maxima (Bezzi) (= *Cephlochrysa* [sic] *hovas* [Bigot])	HI	Hardy, 1960; Nishida, 2002
Exaireta (= *Noexaireta*) *spinigera* (Wiedemann)	HI	Hardy, 1960; Nishida, 2002
Syrphidae		
Syritta oceanica Macquart	HI	Hardy, 1964
Syritta orientalis Macquart	HI	Hardy, 1964
Tephritidae		
Bactrocera cucurbitae (Coquillett)	HI	CABI, 2003; Nishida, 2002; USDA-APHIS-PPQ, 2005; White and Elson-Harris, 1994
Bactrocera dorsalis (Hendel)	HI	CABI, 2004
Bactrocera latifrons (Hendel)	HI	CABI, 2004
Ceratitis capitata (Wiedemann)	HI	CABI, 2003; Liquido et al., 1991

Pest	Geographic Distribution[1]	References
Tipulidae		
Limonia perkinsi (Grimshaw)	HI	Hardy, 1960
HEMIPTERA		
Aleyrodidae		
Aleurocanthus woglumi Ashby	HI, FL	CABI 2004; Hill 1994; HI-DoA 2005; Nishida, 2002; USDA-APHIS-PPQ, 2005
Aleurothrixus antidesmae Takahashi	HI	Nishida, 2002; UH-CTAHR and HI-DoA, 2005
Aleurotulus anthuricola Nakahara	HI	Nishida, 2002; UH-CTAHR and HI-DoA, 2005
Orchamoplatus mammaeferus (Quaintance & Baker)	HI	Nakahara, 1982
Parabemisia myricae (Kuwana)	HI, CA, FL	Nishida, 2002; USDA-APHIS-PPQ, 2005
Trialeurodes vaporariorum (Westwood)	HI, FL	UH-CTAHR and HI-DoA, 2005
Aphididae		
Melanaphis sacchari (Zehnter)	HI, FL	CABI, 2001; Zimmerman, 1948
Sitobion (= *Macrosiphum*) *luteum* (Buckton)	HI, FL	Johnson, 2006; Tenbrink and Hara, 1995
Toxoptera citricida (Kirkaldy)	HI, FL	CABI 2004; Nishida, 2002; USDA-APHIS-PPQ, 2005
Cicadellidae		
Gyponana germari (Stal)	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
Coccidae		
Coccus capparidis (Green)	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
Coccus viridis (Green)	HI, FL	Ben-Dov et al., 2005; Wood, 2000
Vinsonia stellifera (Westwood)	HI, AL, FL, GA	Ben-Dov et al., 2005; CABI, 2004; Dawson, 1999
Coreidae		
Physomerus grossipes (F.)	HI	HI-DoA, 2002
Delphacidae		
Aloha ipomoeae Kirkaldy	HI	Giffard, 1917
Nesosydne ipomoeicola Kirkaldy	HI	Fullaway, 1943

Pest	Geographic Distribution[1]	References
Derbidae		
Lamenia caliginea (Stål)	HI	Kessing and Mau, 1992
Diaspididae		
Andaspis punicae (Laing)	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
Lepidosaphes laterochitinosa Green (= *L. spinulosa* Beardsley)	HI	Beardsley, 1966, 1975; Ben-Dov et al., 2005; Nishida, 2002
Parlatoria ziziphi (Lucas)	HI, MS	CABI, 2003; USDA-APHIS-PPQ, 2005
Pseudaulacaspis subcorticalis (Green)	HI	Ben-Dov et al., 2005
Flatidae		
Siphanta acuta (Walker)	HI	Nishida, 2002; UH-CTAHR and HI-DoA, 2005
Lygaeidae		
Graptostethus manillensis (Stal)	HI	Sakimura, 1944
Miridae		
Halticus tibialis Reuter	HI	CABI, 2001; HI-DoA, 2002
Hyalopeplus pellucidus (Stal)	HI	HI-DoA 2005; UH-CTAHR and HI-DoA, 2005
Pseudococcidae		
Maconellicoccus hirsutus (Green)	HI, CA, FL	CABI, 2003; USDA-APHIS-PPQ, 2005
Nipaecoccus viridis (Newstead)	HI	Ben-Dov et al., 2005; CABI, 2004
Paracoccus marginatus Williams & Granara de Willink	HI, FL	CABI 2004; USDA-APHIS-PPQ, 2005
Pseudococcus cryptus Hempel (= *P. citriculus* Green)	HI	Ben-Dov, 1994; USDA-APHIS-PPQ, 2005
Pseudococcus dendrobiorum Williams	HI	UH-CTAHR and HI-DoA, 2005; Nishida, 2002
Puto barberi (Cockerell)	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
Psyllidae		
Blastopsylla occidentalis Taylor	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
HYMENOPTERA		
Formicidae		
Camponotus variegatus (F. Smith)	HI	Anon., 2006; Nishida, 2002

Pest	Geographic Distribution[1]	References
Pheidole megacephala (F.)	HI	Williams, 1931
ISOPTERA		
Rhinotermitidae		
Reticulitermes speratus (Kolbe)	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
Termitidae		
Nasutitermes cornigera (Motschulsky)	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
LEPIDOPTERA		
Crambidae		
Omphisa anastomosalis (Guenee)	HI	HI-DoA, 2002
Udea despecta (Butler)	HI	Zimmerman, 1958
Geometridae		
Anacamptodes fragilaria (Grossbeck)	HI, CA	HI-DoA, 2002
Lycaenidae		
Lampides boeticus Linnaeus	HI	CABI, 2003; Hill, 1994; Nishida, 2002; USDA-APHIS-PPQ, 2005; Zhang 1994
Lyonetiidae		
Bedellia orchilella Walsingham (= *B. somnulentella*)	HI	HI-DoA, 2002
Noctuidae		
Achaea janata L.	HI	CABI, 2004; Hill, 1994; Nishida, 2002; Robinson et al, 2003; USDA-APHIS-PPQ, 2005
Athetis thoracica (Moore)	HI	Zimmerman, 1958
Chrysodeixis erioosoma (Doubleday)	HI	Swezy, 1944
Eudocima fullonia (Clerck)	HI	CABI, 2004
Spodoptera litura (Fabricius)	HI	CABI, 2003; Hill, 1994; Nishida, 2002; Pogue, 2003; USDA-APHIS-PPQ, 2005; Zhang, 1994
Spodoptera mauritia subsp. *acronyctoides* Guenée	HI	CABI, 2003; Hill, 1994; Nishida, 2002; Pogue, 2003; USDA-APHIS-PPQ, 2005; Zhang, 1994
Stictoptera cucullioides (Guenée)	HI	Zhang, 1994

Pest	Geographic Distribution[1]	References
Pieridae		
Colias sp.	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
Pyralidae		
Cryptoblabes gnidiella (Milliere)	HI	CABI, 2004; Nishida, 2002; Zhang 1994
Hellula undalis (F.)	HI	Zimmerman, 1978
Maruca vitrata Fabricius	HI	CABI, 2003; Hill, 1994; Nishida, 2002; Robinson et al, 2003; USDA-APHIS-PPQ, 2005; Zhang 1994
Tineidae		
Opogona purpuriella Swezy	HI	Zimmerman, 1978
Tortricidae		
Cryptophlebia illepida (Butler)	HI	Zimmerman, 1978
Cryptophlebia ombrodelta (Lower)	HI	CABI, 2004; Robinson et al., 2003; Zimmerman, 1978
Epiphyas postvittana (Walker)	HI	Ebeling 1959; HI-DoA, 2005; Nishida, 2002; UH-CTAHR and HI-DoA, 2005; USDA-APHIS-PPQ, 2005; Zhang, 1994
ORTHOPTERA		
Gryllotalpidae		
Gryllotalpa africana Palisot de Beauvois	HI	CABI, 2004
Pyrgomorphidae		
Atractomorpha sinensis Bolivar	HI	Holdaway, 1944
Tettigoniidae		
Conocephalus saltator (Saussure)	HI	Mau, 1977
Elimaea punctifera (Walker)	HI	UH-CTAHR and HI-DoA, 2005
Xiphidiopsis lita Hebard	HI	Nishida, 2002; USDA-APHIS-PPQ, 2005
PSOCOPTERA		
Ectopsocidae		
Ectopsocus fullawayi Enderlein	HI	Zimmerman, 1948

Pest	Geographic Distribution[1]	References
THYSANOPTERA		
Thripidae		
Chaetanaphothrips signipennis (Bagnall)	HI	Wood, 2000
Dichromothrips corbetti (Priesner)	HI	Nishida, 2002; UH-CTAHR and HI-DoA, 2005
Frankliniella schultzei (Trybom)	HI, FL	CABI, 2004
Helionothrips errans (Williams)	HI	Nishida, 2002; UH-CTAHR and HI-DoA, 2005
Scirtothrips dorsalis Hood	HI	CABI, 2003
Thrips palmi Karny	HI, FL	CABI, 2004; Wood, 2000
CHROMISTA		
Albugo sp. (Oomycetes: Peronosporales)	HI	Farr et al., 2006
Aphanomyces sp. (Oomycetes: Saprolegniales)	HI	Farr et al., 2006
Phytophthora katsurae Ko & Chang (Oomycetes: Pythiales)	HI	Farr et al., 2006
Phytophthora meadii McRae (Oomycetes: Pythiales)	HI	Farr et al., 2006
Phytophthora tropicalis Aragaki & J.Y. Uchida (Oomycetes: Pythiales)	HI	Farr et al., 2006
FUNGI		Farr et al., 2006
Acremonium recifei (Leão & Lôbo) W. Gams (Ascomycetes: Hypocreales)	HI	Farr et al., 2006
Acrodictys fimicola Ellis & Gunnell (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Allomyces arbusculus Butler (Chytridiomycetes: Blastocladiales)	HI	Farr et al., 2006
Alternaria aragakii Simmons (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Amazonia spp. (Ascomycetes: Meliolales)	HI	Farr et al., 2006
Anungitea fragilis Sutton (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006

Pest	**Geographic Distribution[1]**	**References**
Aschersonia marginata Ellis & Everh. (Ascomycetes: Hypocreales)	HI	Farr et al., 2006
Ascochyta spp. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Aspergillus spp. (Ascomycetes: Eurotiales)	HI	Farr et al., 2006
Asteridiella spp. (Ascomycetes: Meliolales)	HI	Farr et al., 2006
Asteromella lantanae Petr. (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Atichia solaridiscoidea Meeker (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Bactridium flavum Kunze (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Beauveria sp. (Ascomycetes: Hypocreales)	HI	Farr et al., 2006
Beltraniella portoricensis (Stevens) Piroz. & Patil (Ascomycetes: Xylariales)	HI	Farr et al., 2006
Bipolaris spp. (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Botryodiplodia sp. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Botryosphaeria parva Pennycook & Samuels (Ascomycetes: Dothideales)	HI	Farr et al., 2006
Botrytis spp. (Ascomycetes: Helotiales)	HI	Farr et al., 2006
Calonectria insularis Schoch & Crous (Ascomycetes: Hypocreales)	HI	Farr et al., 2006
Calonectria pauciramosa Schoch & Crous (Ascomycetes: Hypocreales)	HI, FL	Farr et al., 2006
Cercospora aciculina Chupp (Ascomycota: Mycosphaerellales)	HI	Farr et al., 2006
Ceuthospora latitans (Fr.:Fr.) Höhn. (Ascomycetes: Helotiales)	HI, AK	Farr et al., 2006
Chaetophoma sp. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Cladosporium spp. (Ascomycota: Mycosphaerellales)	HI	Farr et al., 2006

Pest	Geographic Distribution[1]	References
Clypeoseptoria rockii Stevens & Young (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Colletotrichum artocarpi Delacr. (Ascomycetes: Phyllachorales)	HI	Farr et al., 2006; Raabe et al., 1981
Colletotrichum dianellae Stevens & Young (Ascomycetes: Phyllachorales)	HI	Farr et al., 2006
Coniothyrium nitidae Crous & Denman (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
*Cordana musae (*Zimmerm.) Höhn. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Cryptosporiopsis eucalypti Sankaran & B. Sutton (Ascomycetes: Helotiales)	HI	Farr et al., 2006
Curvularia spp. (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Cylindrocarpon spp. (Ascomycetes: Hypocreales)	HI	Farr et al., 2006
Cylindrocladium spp. (Ascomycetes: Hypocreales)	HI	Farr et al., 2006; Killgore, 2005; UH-CTAHR and HI-DoA, 2005
Cylindrosporium sp. (Ascomycetes: Helotiales)	HI	Farr et al., 2006
Cytospora sp. (Ascomycetes: Diaporthales)	HI	Farr et al., 2006
Dinemasporium sp. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Diplodia shearii Petr. (Ascomycetes: Dothideales)	HI	Farr et al., 2006
Discosia spp. (Ascomycetes: Incertae sedis)	HI	CSREES, 2004
Dothiorella opuntiae Siemaszko ex Petr. (Ascomycetes: Dothideales)	HI	Farr et al., 2006
Elsinoë batatas Viégas & Jenkins (Ascomycota: Myriangiales)	HI	CABI, 2001; Raabe et al., 1981
Enthallopycnidium gouldiae Stevens (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Eriosporella calami (Niessl) Höhn. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006

Pest	Geographic Distribution[1]	References
Exserohilum spp. (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Flavodon cervinogilvum (Jungh.) Corner (Basidiomycetes: Polyporales)	HI	CSREES. 2004; Farr et al., 2006; Gilbertson, et al., 2002
Fomitopsis nivosa (Berk.) Gilb. & Ryvarden (Basidiomycetes: Polyporales)	HI, FL, SC	Farr et al., 2006; Gilbertson, et al., 2002
Fusarium spp. (Ascomycetes: Hypocreales)	HI	Farr et al., 2006
Fusicoccum canavaliae Lyon (Ascomycetes: Dothideales)	HI	Farr et al., 2006
Gampsonema exile (Tassi) Nag Raj (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Gloeocoryneum hawaiiense Sutton & Hodges (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Gloeosporium spp. (Ascomycetes: Helotiales)	HI	UH-CTAHR and HI-DoA, 2005
Harknessia gunnerae Stevens & Young (Ascomycetes: Diaporthales)	HI	Farr et al., 2006
Lasmenia sp. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Leptothyrium gleicheniae Stevens & Young (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Libertella kokiae Petr. (Ascomycetes: Xylariales)	HI	Farr et al., 2006
Marssonina sp. (Ascomycetes: Helotiales)	HI	Farr et al., 2006
Melanconium sp. (Ascomycetes: Diaporthales)	HI	Farr et al., 2006
Microporus flabelliformis (Klotzsch) Pat. (Basidiomycetes: Polyporales)	HI	Farr et al., 2006
Mycoacia kurilensis Parmasto (Basidiomycetes: Polyporales)	HI	Farr et al., 2006; Gilbertson, et al., 2002
Mycosphaerella artocarpi Stevens & Young (Ascomycetes: Mycosphaerellales)	HI	Farr et al., 2006; Raabe et al., 1981
Mycotribulus mirabilis Nag Raj & Kendr. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006

Pest	Geographic Distribution[1]	References
Neonectria rugulosa (Pat. & Gaillard) Mantiri & Samuels [= *Nectria rugulosa* Pat. & Gaillard] (Ascomycetes: Hypocreales)	HI	Farr et al., 2006
Penicillium sp. (Ascomycetes: Eurotiales)	HI	CABI, 2001; Raabe et al., 1981
Pestalotia sp. (Ascomycetes: Xylariales)	HI	
Phanerochaete australis Jülich (Basidiomycetes: Polyporales)	HI	Farr et al., 2006; Gilbertson and Adaskaveg, 1993
Phellinus grenadensis (Murrill) Ryvarden (Basidomycetes: Hymenochaetales)	HI, LA	Farr et al., 2006
Phlebia acanthocystis Gilb. & Nakasone (Basidiomycetes: Polyporales)	HI	Farr et al., 2006; Gilbertson, et al., 2002
Phoma agapanthi (Thüm.) Sacc. (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Phoma caricae-papapae (Tarr) Punith. (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Phomopsis caricae-papayae Petr. & Cif. (Ascomycetes: Diaporthales)	HI	Farr et al., 2006
Phyllosticta acicola Bissett & Palm (Ascomycetes: Dothideales)	HI	Farr et al., 2006
Pleurophomopsis eucalypti Petr. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Pyrenochaeta sp. (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Ramularia ipomoea Stevens (Ascomycetes: Mycosphaerellales)	HI	Farr et al., 2006
Rhabdospora pittospori Stevens & Young (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Rhizoctonia spp. (Basidiomycetes: Polyporales)	HI	Farr et al., 2006; Killgore, 2005
Rhizopus sp. (Zygomycetes: Mucorales)	HI	Raabe et al., 1981

Pest	Geographic Distribution[1]	References
Robillarda rhizophorae Kohlm. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Septogloeum arachidis Racib. (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
Septoria canavaliae Lyon (Ascomycetes: Mycosphaerellales)	HI	Farr et al., 2006
Septoriella rockiana (Petr.) Nag Raj (Ascomycetes: Dothideales)	HI	Farr et al., 2006
Sphaceloma sp. (Ascomycetes: Myriangiales)	HI	Farr et al., 2006
Sphaeropsis tumefaciens Hedges (Ascomycetes: Incertae sedis)	HI, FL	CABI, 2004; Farr et al., 2005
Sporonema sp. (Ascomycetes: Helotiales)	HI	Farr et al., 2006
Stagonospora erythrinae Stevens & Young (Ascomycetes: Pleosporales)	HI	Farr et al., 2006
Uredo artocarpi Berk. & Broome (Urediniomycetes: Urediniales)	HI	Gardner, 1991
Verticillium sp. (Ascomycetes:Hypocreales)	HI	Farr et al., 2006
Waydora typica (Rodway) B. Sutton (Ascomycetes: Incertae sedis)	HI	Farr et al., 2006
MOLLUSCA		
Achatinidae		
Achatina fulica Bowdich	HI, FL	Cowie, 1997, 2002b; Robinson, 2006
Ampullaridae		
Pila ampullaceae (Linne)	HI	Robinson, 2006
Pila conica (Wood)	HI	Cowie, 1997, 2002a; Robinson, 2006
Pila sp.	HI	Cowie, 2002b; Robinson, 2006
Pomaceae canaliculata (Lamarck)	HI, CA, TX, FL	Cowie, 1997, 2002b; Robinson, 2006

Pest	Geographic Distribution[1]	References
Helicarionidae		
Parmarion cf. *martensi* (Simroth) [Tentative]	HI	Cowie, 1997, 2002b; Robinson, 2006
Helicidae		
Cornu aspersum (Müller) [= *Cryptomphalus aspersus* (Müller); *Helix aspersa* Müller]	HI, CA[2], OR[2], LA, PA[2], NC[2], NJ[2], SC[2], UT, WA	Cowie, 1997, 2002b; Robinson, 2006
Philomycidae		
Meghiamtium straitum (Hasselt)	HI	Cowie, 2002a; Robinson, 2006
Subulinidae		
Beckianum beckianum (Pfeiffer)	HI	Robinson, 2006
Paropeas achatinaceum (Pfeiffer)	HI	Cowie, 1997; Robinson, 2006
Veronicellidae		
Laevicaulis alte (Ferussac)	HI	Cowie, 1997, 2002b; Robinson, 2006
Veronicella cubensis (Pfeiffer)	HI (Tentative), AS, PR	Cowie, 1997, 2002b; Robinson, 2006
NEMATODA		
Anguinidae		
Ditylenchus dipsaci (Kühn) Filipjev	HI, US	CABI, 2001
Aphelenchidae		
Aphelenchoides sp.	HI	USDA-ARS, 2005
Seinura filicaudata Christie	HI	Handoo et al., 1998; USDA-ARS, 2005
Belonolaimidae		
Tylopharynx annulatus (Cassidy) Golden	HI	USDA-ARS, 2005
Criconematidae		
Criconemoides palmatum (Siddiqi & Southey)	HI	USDA-ARS, 2005
Heteroderidae		
Meloidogyne konaensis Eisenback	HI	Zhang and Schmitt, 1994
Mononchidae		
Monochus sp.	HI	USDA-ARS, 2005

Pest	Geographic Distribution[1]	References
Panagrolaimidae		
Panagrolaimus sp.	HI	USDA-ARS, 2005
Pratylenchidae		
Hirschmanniella diversa Sher	HI	USDA-ARS, 2005
Rhabditidae		
Rhabditus sp.	HI	USDA-ARS, 2005

[1] Distribution: AK = Alaska, AL = Alabama, AS = American Samoa, CA = California, FL = Florida, GA = Georgia, HI = Hawaii, LA = Louisiana, MS = Mississippi, NJ = New Jersey, NC = North Carolina, OR = Oregon, PA = Pennsylvania, PR = Puerto Rico, SC = South Carolina, TX = Texas, UT= Utah, and WA = Washington

[2] These states have quarantines and or eradication programs in place

Table A2. Selected pest plants (i.e., weeds, invasive plants) in Hawaii that are quarantine-significant for the contiguous 48 states in the United States. NOTE: This is not a complete list of all quarantine-significant plant pests from Hawaii and should not be regarded as such. All pest plant references include USDA NRCS, 2006.

Family	Pest plant	Geographic distribution[1]	Noxious weed list[2]			Additional References
			HI	Fed	Other[1]	
Acanthaceae	*Asystasia gangetica* (L.) T. Anders.	HI, FL				
Agavaceae	*Furcraea foetida* (L.) Haw.	HI, FL				HEAR, 2006
Amaranthaceae	*Alternanthera sessilis* (L.) R. Br. ex DC.	HI, FL, GA, LA, TX		✓	AL, AR, CA, FL, MA, MN, NC, OR, SC, VT	
Anacardiaceae	*Schinus terebinthifolius* Raddi	HI, CA, FL, PR, TX			FL, TX	
Araliaceae	*Schefflera actinophylla* (Endl.) H.A.T. Harms	HI, FL, PR				
Asteraceae	*Ageratina adenophora* (Spreng.) King & H.E. Robins.	HI, CA	✓	✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
	Elephantopus mollis Kunth	HI, PR	✓			
	Montanoa hibiscifolia (Benth.) Standl.	HI	✓			

Family	Pest plant	Geographic distribution[1]	Noxious weed list[2]			Additional
			HI	Fed	Other[1]	References
Asteraceae	*Senecio madagascariensis* Poir.	HI	✓			
	Tridax procumbens L.	HI, FL, PR		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
Basellaceae	*Anredera cordifolia* (Ten.) Steenis	HI, CA, DC, FL, LA, PR, TX	✓			
Bignoniaceae	*Spathodea campanulata* Beauv.	HI, FL, PR				HEAR, 2006
Boraginaceae	*Cordia glabra* L.	HI, PR				APWG, 2006
Cactaceae	*Cereus hildmannianus* K. Schum.	HI, PR	✓			
	Harrisia martinii (Labouret) Britt.	HI	✓			
Casuarinaceae	*Casuarina equisetifolia* L.	HI, FL, PR			FL	
Cecropiaceae	*Cecropia obtusifolia* Bertol.	HI				UH-Botany, 1998
Commelinaceae	*Commelina benghalensis* L.	HI, CA, FL, GA, LA		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
Convolvulaceae	*Ipomoea aquatica* Forssk.	HI, CA, FL		✓	AL, AZ, AR, CA, FL, NC, OR, SC, TX, VT	
Cucurbitaceae	*Coccinia grandis* (L.) Voigt	HI, FL	✓			
Fabaceae	*Caesalpinia decapetala* (Roth) Alston	HI, PR				UH-Botany, 1998
	Prosopis juliflora (Sw.) DC.	HI	✓			
	Prosopis pallida (Humb. & Bonpl. ex Willd.) Kunth	HI, PR		✓	AL, CA, MA, MN, NC, OR, SC, VT	
	Pueraria phaseoloides (Roxb.) Benth.	HI, PR	✓			
	Spartium junceum L.	HI, CA, OR, WA	✓		OR, WA	
	Ulex europaeus L.	HI, CA, MA, NY, OR, PA, VA, WA, WV	✓		CA, OR, WA	

Family	Pest plant	Geographic distribution[1]	Noxious weed list[2]			Additional
			HI	Fed	Other[1]	References
Lamiaceae	*Hyptis pectinata* (L.) Poit.	HI, FL, PR	✓			
	Hyptis suaveolens (L.) Poit.	HI, PR	✓			
Malvaceae	*Malachra alceifolia* Jacq.	HI, FL, PR	✓			
	Urena lobata L.	HI, FL, LA, PR	✓			
Marattiaceae	*Angiopteris evecta* (J.R. Forst.) Hoffmann	HI				UH-Botany, 1998
Melastomataceae	*Clidemia hirta* (L.) D. Don	HI, PR	✓			ISSG, 2006
	Medinilla venosa (Blume) Blume	HI				
	Melastoma candidum D. Don	HI	✓			
	Melastoma malabathricum L.	HI		✓		
	Miconia calvescens DC.	HI	✓			
	Oxyspora paniculata (D. Don) DC.	HI				UH-Botany, 1998
	Tibouchina herbacea (DC.) Cogn.	HI	✓			
	Tibouchina longifolia (Vahl) Baill. ex Cogn.	HI	✓			
	Tibouchina urvilleana (DC.) Cogn.	HI, PR	✓			
Mimosaceae	*Acacia mearnsii* Willd.	HI, CA	✓			
Myricaceae	*Morella faya* (Ait.) Wilbur	HI	✓			
Myrsinaceae	*Ardisia elliptica* Thunb.	HI, FL	✓			
Myrtaceae	*Melaleuca quinquenervia* (Cav.) Blake	HI, FL, LA, PR		✓	AL, CA, FL, MA, NC, OR, SC, TX, VT	
	Rhodomyrtus tomentosus (Ait.) Hassk.	HI, FL	✓		FL	

Family	Pest plant	Geographic distribution[1]	Noxious weed list[2]			Additional References
			HI	Fed	Other[1]	
Oleaceae	*Fraxinus uhdei* (Wenzig) Lingelsh.	HI, PR				HEAR, 2006; UH-Botany, 1998
Papaveraceae	*Bocconia frutescens* L.	HI, PR	✓			
Passifloraceae	*Passiflora bicornis* P. Mill.	HI	✓			
Pinaceae	*Pinus caribaea* Morelet	HI, PR				UH-Botany, 1998
Piperaceae	*Piper aduncum* L.	HI, FL, PR	✓			
Pittosporaceae	*Pittosporum undulatum* Vent.	HI, CA	✓			
Poaceae	*Cenchrus echinatus* L.	HI, AL, AZ, CA, DC, FL, GA, LA, MS, NC, NM, SC, TX			AZ, CA	UH-Botany, 1998
	Chrysopogon aciculatus (Retz.) Trin.	HI		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
	Cortaderia jubata (Lem.) Stapf	HI, CA, OR				
	Cymbopogon refractus (R. Br.) A. Camus	HI	✓			
	Digitaria abyssinica (Hochst. ex A. Rich.) Stapf	HI		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
	Paspalum scrobiculatum L.	HI, AL, GA, MD, NJ, TX		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
	Pennisetum macrourum Trin.	HI, CA, TX		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
	Saccharum spontaneum L.	HI, PR		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
	Themeda villosa (Poir.) A. Camus	HI	✓			
Polygonaceae	*Emex spinosa* (L.) Campd.	HI, CA, FL, MA, TX	✓	✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
Pontederiaceae	*Monochoria vaginalis* (Burm. f.) K. Presl ex Kunth	HI, CA		✓	AL, CA, FL, MA, NC, OR, SC, VT	

Family	Pest plant	Geographic distribution[1]	Noxious weed list[2]			Additional References
			HI	Fed	Other[1]	
Proteaceae	*Grevillea banksii* R. Br.	HI	✓			
Rhizophoraceae	*Bruguiera sexangula* (Lour.) Poir.	HI				HEAR, 2006
Rosaceae	*Rubus ellipticus* Sm. var. *obcordatus* Focke	HI	✓			
	Rubus niveus Thunb.	HI, FL	✓			
	Rubus sieboldii Blume	HI	✓			
Rubiaceae	*Cinchona pubescens* Vahl	HI				ISSG, 2006
Solanaceae	*Solanum robustum* Wendl.	HI				
	Solanum torvum Sw.	HI, AL, FL, MD, PR		✓	AL, CA, FL, MA, MN, NC, OR, SC, VT	
Sterculiaceae	*Melochia umbellata* (Houtt.) Stapf	HI				UH-Botany, 1998
Tiliaceae	*Heliocarpus popayanensis* Kunth	HI				UH-Botany, 1998
	Triumfetta rhomboidea Jacq.	HI, FL, PR	✓			
	Triumfetta semitriloba Jacq.	HI, FL, GA, PR	✓			
Ulmaceae	*Trema orientale* (L.) Blume	HI				HEAR, 2006
Verbenaceae	*Clerodendrum japonicum* (Thunb.) Sweet	HI, MD				HEAR, 2006; UH-Botany, 1998
Zingiberaceae	*Hedychium gardnerianum* Shepard ex Ker-Gawl.	HI		✓		

[1] Distribution: AL = Alabama, AR = Arkansas, AZ = Arizona, CA = California, DC = District of Columbia, FL = Florida, GA = Georgia, HI = Hawaii, LA = Louisiana, MD = Maryland, MA = Massachusetts, MN = Minnesota, MS = Mississippi, NC = North Carolina, NJ = New Jersey, NM = New Mexico, NY = New York, OR = Oregon, PA = Pennsylvania, PR = Puerto Rico, SC = South Carolina, TX = Texas, VA = Virginia, VT = Vermont, WA = Washington, and West Virginia.

[2] ✓ = Listed

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Appendix B. *Modeling the likelihood of bale-rupturing accidents during transport of baled municipal solid waste (MSW) by truck, rail, or barge.*

I. Introduction

Here we describe the approaches used to estimate the likelihoods of bale-rupturing accidents to occur while moving baled MSW to landfills on the mainland United States by either truck, rail, or barge. We did this here for generic but realistic travel distances of 25 truck miles, 500 rail miles, and 140 barge miles.

II. Models And Methods

A. Standard simulation settings and functions

All probabilistic analyses and simulations were performed using @Risk ver. 4.5.2 Professional (Palisade Corporation, 31 Decker Road, Newfield, NY 14867). Simulation settings were as follows unless otherwise specified: number of iterations = 20,000; sampling type = Latin Hypercube; and random seed = 101. Equations below are shown in their general form; actual equations used in @Risk can be found in the formulae section in Fig. 1.

Two equations were used most often for probabilistic predictions. Most nodes, or pathway processes, in the model were binomial, meaning that n independent identical trials were conducted, each with the same probability of success, p, as follows (e.g., Vose, 2000):

$$S = \text{binomial}(n, p) \qquad [1]$$

where S is the number of successes observed. Both n and p vary by iteration but are 'constant' across the n trials in a single iteration.

The value of p was often determined from a beta distribution, which estimates the probability of success from the observed number of successes, s, and the number of trials, n, as follows:

$$p = \text{beta}(s + 1, (n - s) + 1) \qquad [2]$$

For example, for the probability of an accident happening to a freight barge (below), n = total number of accidents and s = number of accidents for freight barges. More generally, Eqn. (2) is the probability of success during the next (+1) time period or event, given the number of successes and trials already observed.

B. Numbers and distances of trips

This depended upon the annual amount of baled MSW transported, average bale mass, and the bale-carrying capacity of each type of conveyance. We estimated the total annual amount of baled MSW as 300,000 tons (PRER, 2004) with ten percent variability. The resulting distribution was uniform from 270,000 to 300,000 tons annually. In addition, the best estimate we have for the annual number of oceanic barge trips to transport that amount is about 36 trips. We estimated the number of trips required as a uniform distribution between 32 and 36. The number of tons of baled MSW per trip was simply the total amount divided by the number of trips.

From company information, bale mass was estimated as a uniform distribution between 3.2 and 3.35 (lb.) tons (6,400 to 6,700 pounds), which is about 2900 to 3000 kg.

The annual number of bales transported was the total mass of baled MSW divided by the mass per bale, and rounded up to the nearest whole number. The mean number of bales per barge trip was the total number of bales divided by the number of barge trips, again rounded up to the nearest integer. The number of bales per train trip was assumed to be the number per barge, since the capacity of a 100-car train exceeded that necessary to move all the bales on a single barge. The carrying capacity of a flatbed trailer truck is about 22.7 metric tons, which gave 7 bales per truck on average.

The total number of trips was calculated as the annual number of bales divided by the carrying capacity for each conveyance, and rounded up. The total number of vehicle miles traveled (VMT) was the product of the trip distance and the number of trips. For barges, the number of ton-miles was calculated as the product of total tons and the average trip distance.

C. Total numbers of accidents

In this case, as conveyance move over the total trip distance a constant probability of an accident occurring exists: this describes a Poisson process. In a Poisson process the two parameters are λ, the probability of an event (accident) occurring, and d, the amount of exposure. Here d is the distance traveled; in other situations time, t, is often the measure of exposure. The number of events, s, occurring within d is the following (Vose, 2000):

$$s = \text{Poisson}(\lambda d) \qquad [3]$$

As the exposure level d or the rate λ increase, so does s.

The national accident rates for trucks and trains are based on VMT, while that for barges is based on ton-miles. For trucks the estimated mean rate was 1.96 accidents per million VMT, based on data for numbers of fatal, non-fatal, and property damage-only accidents (Federal Motor Carrier Safety Administration, 2004) and total VMT (Analysis Division, 2006) for the years 2000 to 2004. We specified the rate as a pert distribution with the above mean, and minimum and maximum values equal to the lower and upper 99 percent confidence intervals over the five years of data (Fig. B1).

For trains, we estimated the national accident rate from ten years of data, 1996 to 2005 (Office of Safety Analysis, 2006). The overall mean was 3.94 accidents per million VMT, for all companies and all modes (e.g., yards and main lines). The distribution based on the 99 percent confidence limits of the mean was a pert with minimum = 3.665, and maximum = 4.215 (Fig. B2). Ninety percent of the sampled values were between 3.77 and 4.11.

For barges the accident rate was calculated from recent statistics for accidents on the Columbia River. In 2000, 80 accidents were reported, and 87 were reported in 2001 (U.S. Army Corps of Engineers, 2002, 2003). The corresponding values for annual ton-miles (billions) of freight moved were 2.9 in 2000 and 3.0 in 2001, giving annual accident rates of 27.6 accidents per billion ton-mile in 2000, and 29.0 in 2001. In the model we used the mean rate of 28.3 accidents per billion ton-miles.

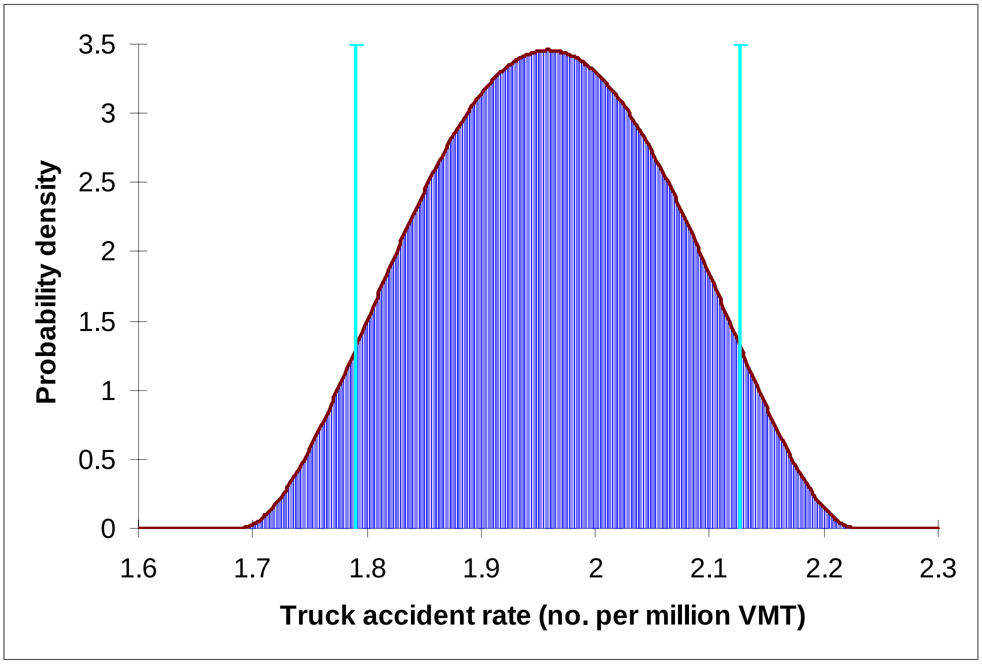

Fig. B1. The distribution for the truck accident rate, number per million vehicle miles traveled (VMT), based on data from 2000 to 2004. Lines indicate the 5th and 95th percentiles, so 90 percent of the sampled values will fall in between the lines.

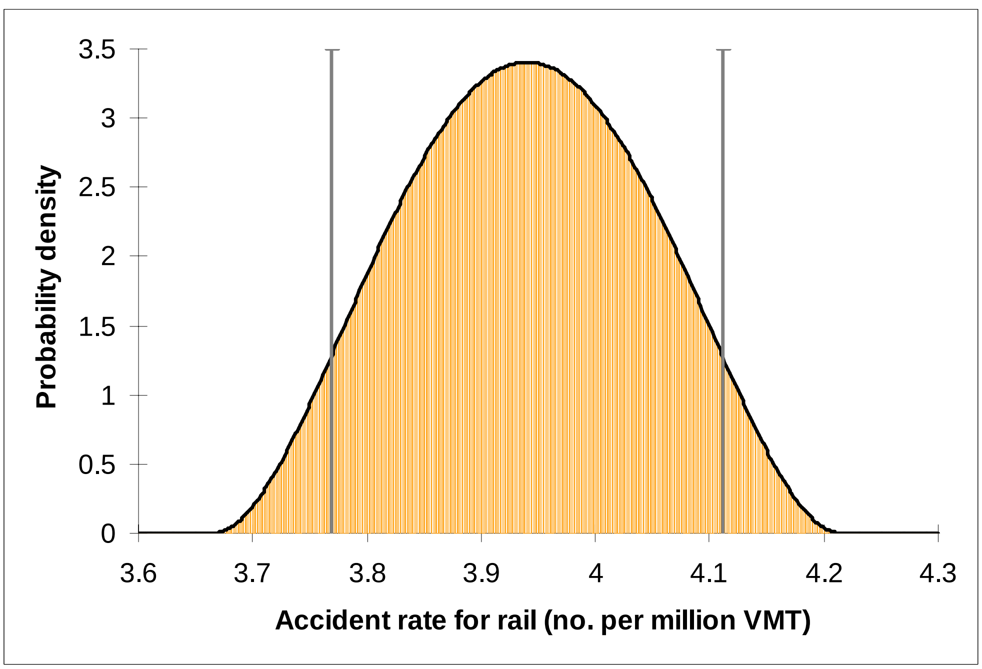

Fig. B2. The distribution for the truck accident rate, in number per million vehicle miles traveled (VMT), based on data from 1996 to 2005. Lines indicate the 5th and 95th percentiles, so 90 percent of the sampled values will fall in between the lines.

D. Numbers of relevant accidents

Not every accident, however, is relevant to transportation of baled Hawaiian MSW. For trucks in particular, we needed to estimate the number of intrastate accidents to flat-bed trucks, because trips to landfills will not involve interstate travel, and because trucks such as cargo vans will not be used to transport bales. In all cases, the number of relevant accidents was a binomial process with N = total accidents and p = the likelihood of an accident being relevant.

For trucks, we estimated the likelihood of a relevant accident as the product of the likelihood of accidents during intrastate travel, and the proportion of accidents occurring to body types that could carry bales (e.g., flatbed trailer vs. cargo van). Both of these were done specifically for data from the states of Idaho, Oregon, and Washington, because rates there may differ from nationwide statistics. The probability of an accident during intrastate travel in those states was a beta distribution with s = 996 and n = 6,703 (Federal Motor Carrier Safety Administration, 2004), which had a mean value of 0.15, and 90 percent of sampled values were between 0.142 and 0.156. The probability of an accident occurring to a bale-carrying truck body type was also a beta, with s = 361 and n = 3,483, based on data for fatal, injurious, and tow-away accidents (Analysis Division, 2006). That distribution had a mean value of 0.10, and 90 percent of the sampled values were between 0.096 and 0.113.

For trains, we were interested in accidents to freight trains on main lines, since about two-thirds of all rail accidents occur in and around rail yards (Office of Safety Analysis, 2006), which are likely to be lower speed accidents in which bales would not rupture. First we estimated the likelihood that an accident occurred to a freight train based on data for 2000 to 2004 (Federal Railroad Administration, 2001, 2003, 2004, 2005a, b). Overall, 8,251 accidents out of 17,588 were to freight trains. From 99 percent confidence intervals for the annual means, this gave a pert distribution with mean = 0.47, minimum = 0.417, and maximum = 0.523. Ninety percent of the sampled values were between 0.437 and 0.503. Similarly, the likelihood of an accident being on a main line was based on data in which 4,524 of the 8,251 freight train accidents occurred on main lines. This data gave a pert distribution with mean = 0.55, minimum = 0.52, and maximum = 0.58, with 90 percent of sampled values between 0.53 and 0.57. The overall probability of an accident being relevant was the product of the two probabilities for freight and main line accidents.

For barges, we were only interested in accidents to freight barges. Very few accidents on the Columbia River in 2000 and 2001 (the most recent data) involved freight barges (U.S. Army Corps of Engineers, 2002, 2003). We estimated the likelihood that an accident was to a freight barge as a beta with s = 4 and n = 167, which had a mean value of 0.03, and 90 percent of sampled values were between 0.012 and 0.054.

The probability that a relevant accident would occur annually (p_{rel}) was estimated, for each conveyance type, by calculating the number of iterations in which at least one occurred.

E. Numbers of bale-rupturing accidents

Just as not every truck, train or barge accident will involve transport of baled MSW, not every accident involving baled MSW will result in ruptures of bales. For example, a “fender bender” can be counted as an accident but is highly unlikely to result in ejection and rupture of cargo. Accordingly, the number of potential bale-rupturing accidents was a binomial process with N = the number of relevant accidents and p = the probability that an accident is of a type that could rupture bales.

For trucks, the number of accidents that could results in bale ruptures was determined from data from 1991 to 2000 on flatbed trucks carrying hazardous cargo (Craft, 2004). Out of 5,208 total crashes (= n), 1,690 (= s) resulted in cargo spills. This beta distribution gave a mean of 0.325, and 90 percent of the sampled values were between 0.314 and 0.335 (Fig. B3).

For trains, we found total accidents and the number of accidents likely to cause bale ruptures from 2000 to 2004 data on releases of hazardous materials relative to the total number of accidents involving hazardous materials (Federal Railroad Administration, 2001, 2003, 2004, 2005a, b). The data directly estimated the proportion of rail accidents in which spills occur, and since hazardous materials are packaged and handled similarly to baled MSW, using these numbers seemed very appropriate. Overall, releases occurred in only 154 of 3,961 accidents involving hazardous materials. Using 99 percent confidence limits for the annual mean, we specified the distribution as a pert with mean = 0.039, a minimum value of 0.028, and a maximum value of 0.051, where 90 percent of the sampled values were between 0.032 and 0.046.

For barges, we based our estimate of the likelihood of bale-rupturing on the number of releases of material in accidents involving transport of hazardous material. As with trains, this data seemed most relevant to the quantity being estimated, and did not require assumptions about accident types based on speed or other proxies for release risk. The most recent available data was for 1990 to 1997 (Office of Hazardous Materials Safety, 1999). Over that period, 6 of 63 accidents involving hazardous materials resulted in releases. A beta distribution with s = 6 and n = 63 gave a mean of 0.11, and 90 percent of sampled values were between 0.053 and 0.177 (Fig. B4).

The probability that a bale-rupturing accident would occur annually (p_{rupt}) was estimated, for each conveyance type, by calculating the number of iterations in which at least one occurred.

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Appendix D. Risk of Introduction of Pests to Washington State via Municipal Solid Waste from Hawaii.

United States
Department of
Agriculture

Animal and Plant
Health Inspection
Service

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Updated, September
2006

The Risk of Introduction of Pests to Washington State via Plastic-Baled Municipal Solid Waste from Hawaii

Executive Summary

Companies have proposed transporting large volumes of municipal solid waste (MSW) in airtight bales from Hawaii to landfills in the continental United States. In a previous general pest risk assessment, CPHST found that the risk of introduction of pests from Hawaii via this pathway was insignificant. Here we focus on a proposal to transport baled MSW to a landfill in Klickitat County, Washington State. We assessed whether any exceptional risks associated with this particular proposal would justify a different recommendation than was made for the general pathway.

Two companies propose to move baled MSW by barge up the Columbia River, unload it in Roosevelt, WA, and move it eight miles by truck to the Roosevelt Regional Landfill. The landfill is a modern facility complying with relevant federal regulations. The transportation methods involved are low risk, and the local environment and climate do not pose exceptional risks. In particular, the climate in Klickitat County is much drier and colder than that in most large cities in Hawaii, which should greatly reduce the compatibility of some Hawaiian pests. None of the relevant Federal or State quarantine plant pests, which included insects, diseases, and pest plants (i.e., weeds, invasive plants), seemed to pose an exceptional threat of surviving, escaping and establishing via this pathway.

In conclusion, this proposal closely followed the procedures outlined in the general pest risk assessment, and no factors justified a different recommendation. Thus, transportation of baled MSW from Hawaii to Klickitat County, Washington, poses an insignificant risk of pest establishment. We recommend that the pathway be monitored to ensure that procedures and compliance do not differ significantly from what was described here and in the general pest risk assessment.

Introduction

The Center for Plant Health Science and Technology (CPHST) completed, at the request of the State of Hawaii, a pest risk assessment of the likelihood of introduction of pests into the continental United States via the transport of plastic-baled municipal solid waste (MSW) from Hawaii (CPHST, 2006). The garbage will be baled by compressing it and wrapping it in adhesive-backed, plastic film barriers made of low density polyethylene (LDPE), creating airtight packages. Bales would be transported by barge to a receiving facility on the mainland and buried intact in landfills in accordance with regulations for solid waste disposal (40CFR§258; EPA (1993)). Each company would transport perhaps 300,000 tons of MSW per year. A pest risk assessment was required because garbage from Hawaii cannot enter the continental U.S. under current federal regulations for plant pests (7CFR§330.400). The assessment dealt with parts of the pathway expected to be valid for any company proposing to transport the baled waste.

In the pest risk assessment, CPHST concluded that if the proposed procedures were followed, transportation of baled Hawaiian MSW posed an insignificant risk of pest establishment (CPHST, 2006). Some reasons for that were that exclusion of most yard and agricultural waste from the pathway would greatly reduce the presence of potential plant pests or propagules in the bales; insects, mollusks, and some pathogens and weed seeds are unlikely to survive compaction and transport in the bales; and other pathway procedures (e.g. proper staging, mollusk-free certification, monitoring during transport) would adequately protect against introductions of pests. A qualitative risk analysis indicated that the cumulative risk ratings for the introduction of insects, mollusks, pathogens, and pest plants in baled MSW were each Low.

Pacific Rim Environmental Resources, Inc. (PRER) (Luneke, 2004; PRER, 2004) and Hawaii Waste Systems, LLC (HWS) (HWS, 2006), have proposed moving baled MSW from Hawaii to a landfill in Washington State. Bales will be transported by barge to Roosevelt, Washington, and by truck to the Roosevelt Regional Landfill in Klickitat County. The objective of this assessment is to evaluate the proposals to assess whether any exceptional risk factors warrant a recommendation other than the Low risk ratings given previously. The procedures for transporting baled MSW in the documents closely followed the general procedures evaluated in CPHST (2006). Specific items considered here include the destination landfill, the Federal and State quarantine pests of concern, the type(s) of transportation used to move bales after reaching the mainland, and any other notable factors in the proposals. Refer to CPHST (2006) for definitions of key terms.

Review of proposal

The details of the proposals are, for PRER, in PRER (2004) and Luneke (2004), and, for HWS, in HWS (2006). As mentioned above, the general procedures closely follow those used in the general assessment (CPHST, 2006). Some important details include the following:

1) The baling system used will create rectangular bales weighing about 3 metric tons (pers. comm., Luneke, PRER Inc.), or between 2 and 4 pound tons (HWS, 2006); in both cases bale density will be about 1000 kg per cubic meter
2) Bales will move on barges up the Columbia River directly to Roosevelt, WA, a distance from the ocean of about 253 miles
3) Bales will be unloaded and moved eight miles by truck to the landfill

In addition, the companies specified their intention to do the following:
▪ Not allow waste to contact soil after collection;
▪ Rewrap and re-stage imperfectly sealed bales found during staging in Hawaii;
▪ Use tractors with "grabbing-type" lift arms or well-padded tines to handle rectangular bales;
▪ Monitor bales for ruptures and punctures, and track bales in an electronic manifesting system; and
▪ Place baling machines at handling sites to seal ruptured bales when necessary, or move ruptured bales in re-sealed liners and bags designed for safe transport of hazardous waste.

Destination landfill
Roosevelt Regional Landfill (see http://www.rabanco.com/disposal.htm), in Klickitat County near the town of Roosevelt (Fig. 1), is a modern facility that meets regulations and EPA guidelines for design and operation (e.g., EPA, 1993). We have no reason to expect improper landfilling of bales at this site, and therefore the mitigation likely to come from landfilling seems valid (CPHST, 2006).

Transportation of bales
As discussed above, bales will be barged up the Columbia River to Roosevelt, offloaded onto trucks, and driven about 4 miles to the landfill. Roosevelt Regional Landfill has only had one significant truck accident in eight years of transporting loads from the dock to the landfill in Washington (pers. comm., D. Luneke, PRER). Both of those means of transport are low risk for potential bale-rupturing accidents (CPHST, 2006). Adapting the generic quantitative risk analysis for bale-rupturing accidents to transport of bales to Roosevelt Regional Landfill required an increase in barge miles from 140 to 253, and a decrease in truck miles from 25 to 4. When these changes were made, the risk of any bale-rupturing accident for trucks was reduced from 0.0035 to 0.0003, while that for barges increased from 0.0029 to 0.0037. Mean years to the first bale-rupturing accident for trucks was 3333, and that for barges was 130. We found a 95 percent chance that the first truck accident would occur only after 171 years, or after 7 years for barge transport. The risk of catastrophic rupture of bales while they are being transported by truck or barge to Roosevelt Regional Landfill is therefore very low.

Local environment: geography and climate

Although the likelihood of pests or pest propagules escaping from bales is extremely low, for completeness we briefly discuss here the environment through which bales will be transported and into which bales will be deposited. Five general habitat types exist in Klickitat County: 1) dry coniferous forest, 2) dry grassland, 3) sagebrush desert, 4) farmland (dry > irrigated), and 5) riparian (Hoyle Consulting Services, 2002). The area around the town of Roosevelt and extending up to the landfill is largely made up of two habitat types, orchards (rainfed) and dry cropland (Hoyle Consulting Services, 2002: Appendix 1, Figure A-1). The great majority of crop area is devoted to forage and wheat (National Agricultural Statistics Service, 2004a). Smaller areas have fruits and nuts, and row crop vegetables.

As indicated above, a key feature of Klickitat County is the dryness of the area, which differs from many Hawaiian cities. Annual precipitation near Roosevelt Regional Landfill is about 6 to 9 inches (Rabanco, 2004); Klickitat County is in the rain shadow of the Cascade Mountains (Department of Assessment and GIS, 2003). The average daily minimum temperature in the county is 24° F, and the average daily maximum is 80° F (Department of Assessment and GIS, 2003). In addition, average annual snowfall is about 10 inches. Below-freezing temperatures and snowfall would both mitigate against the establishment of tropical and subtropical Hawaiian pests.

Potential plant pests

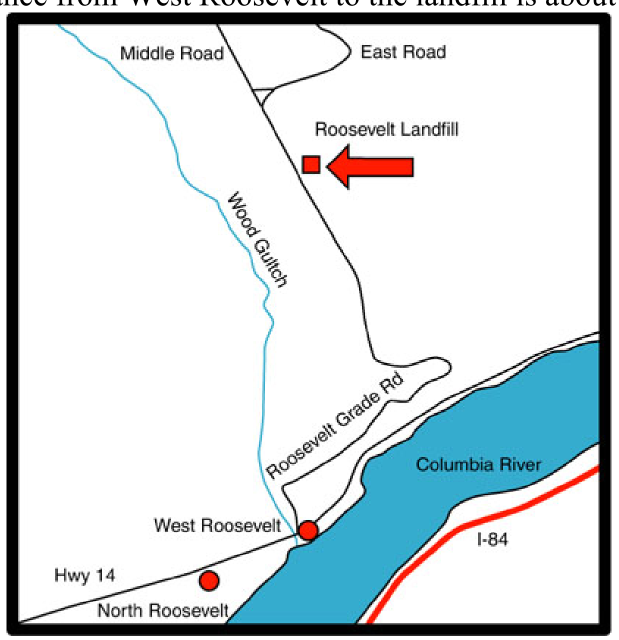
Quarantine plant pests for Washington State include pathogens, insects, and pest plants (Laboratory Services Division, 1999; PRER, 2004: Exhibit 2). We expect an extremely low incidence of these pests in typical MSW (CPHST, 2006). Washington also has no quarantines for terrestrial mollusks, which pose no exceptional risks here (see CPHST, 2006).

No quarantine insects for Washington are present in Hawaii (Montgomery and Manning, 2004) but some insects in Hawaii are Federal quarantine pests (CPHST, 2006). We do not discuss insects further since they are unlikely to survive in the bales.

Bacterial, fungal, and viral diseases of plants under Federal or Washington State quarantine are present in Hawaii (APS-APHIS Virus Working Group, 2003; University of Hawaii and Hawaii Department of Agriculture, 2004) and could be transported (Table 1). For various reasons, these organisms are very unlikely to establish in Washington State via this pathway (Table 2), and, as above, no exceptional factors in the proposal appear to make pathogens more likely to establish in this case than in the previous assessment (CPHST, 2006).

Twenty quarantine pest plants for Washington are present in Hawaii (Table 3, and Luneke (2004)). All of those species are present in Washington, although perhaps under ongoing control or eradication (USDA NRCS, 2004). They seem more likely to disperse to new areas from within the state than via baled MSW from Hawaii. Other quarantine significant pest plants are also present in Hawaii (CPHST, 2006), but no exceptional factors in the proposal increased the risk associated with pest plants here relative to the previous assessment.

Figure 1. Map[1] of Roosevelt Regional Landfill and surrounding locations.
The distance from West Roosevelt to the landfill is about 4 miles.



[1] From Klickitat County Solid Waste, 2001 (http://www.klickitatcounty.org/SolidWaste/ContentROne.asp?fContentIdSelected=1742226046&fCategoryIdSelected=1677677085)

Table 1. Quarantine diseases for Washington State present in Hawaii.

Genus and species (if applicable)	Common name	Host (in HI)	Type
Bean common mosaic *potyvirus*	Bean common mosaic virus	Beans	Virus
Colletotrichum lindemuthianum	Bean anthracnose	Beans	Fungus
C. truncatum	Lentil anthracnose	Alfalfa	Fungus
Clavibacter michiganensis spp. *sepedonicus*[1]	Bacterial ring rot	Potato, eggplant	Bacteria
Erwinia carotovora subsp. *atroseptica*[1]	Soft rot	Potato	Bacteria
Potato leaf roll *polerovirus*[1]	Potato leaf roll virus	Potato	Virus
Potato Y *potyvirus* (N strain)	Potato virus Y (necrotic)	Potato	Virus
Pseudomonas syringae pv. *phaseolicola*	Halo blight	Beans	Bacteria
P. syringae pv. *syringae*	Brown spot disease	Beans	Bacteria
Sclerotium cepivorum	Onion white rot	Onions	Fungus
Verticillium albo-atrum	Verticillium wilt	Potato, tomato	Fungus
Xanthomonas albilineans[2]	Sugarcane leaf scald	Sugarcane	Bacteria
X. campestris pv. *phaseoli*	Common bean blight	Beans	Bacteria
X. phaseoli var. *fuscans*	Fuscous blight	Beans	Bacteria
X. vasculorum[2]	Sugarcane bacterial blight	Sugarcane	Bacteria

[1] Washington State has a general quarantine for seed potato diseases, and a specific quarantine for Potato virus Y (Laboratory Services Division, 1999)
[2] Federal quarantine

Table 2. Rationales for pathogens being Low risk for establishment in Washington State via baled waste from Hawaii.

Pathogen	Rationale for Low risk rating
Bean common mosaic *potyvirus*	▪ Seed-borne and aphid-vectored: infected seeds unlikely to be present and aphids highly unlikely to survive
Clavibacter michiganensis spp. *sepedonicus* *Pseudomonas* spp. *Xanthomonas* spp.	▪ These bacterial pathogens need oxygen and are unlikely to survive in the bales
Colletotrichum lindemuthianum *C. truncatum*	▪ Primarily seed-borne, therefore presence in the bale and dispersal after escape are unlikely ▪ Dormant agents may need oxygen for survival
Erwinia carotovora subsp. *atroseptica*	▪ Short-term survival outside of a suitable host (e.g., in soil) ▪ Low survival in dry conditions, so Klickitat County may be a poor habitat
Potato virus Y *potyvirus* Potato leaf roll *polerovirus*	▪ Aphid-vectored or spread by propagative host material, both of which are highly unlikely to survive in the bales
Sclerotium cepivorum	▪ Germination induced by chemicals exuded by *Allium* sp. roots ▪ Low likelihood of contact with host because Klickitat County has few acres of onion (National Agricultural Statistics Service, 2004b)
Verticillium albo-atrum	▪ Establishing anoxic soil conditions, i.e. flooding, is a commonly used cultural practice for control of Verticillium wilt, so it is unlikely to survive in the bale

Table 3. Quarantine Hawaiian pest plants present ("✓"), from three sources, and presence (+) in Washington State (WA). Synonyms were not listed.

	Genus species	Common name[1]	Presence in HI (by source[2])			WA
			PLANTS	Bishop	Manual	
1	*Carduus pycnocephalus*	Italian plumeless thistle	✓	✓	✓	+
2	*Centaurea biebersteinii*	spotted knapweed	✓	✓	✓	+
3	*C. melitensis*	Maltese star-thistle	✓	✓	✓	+
4	*Cirsium vulgare*	bull thistle	✓		✓	+
5	*Convolvulus arvensis*	field bindweed	✓	✓	✓	+
6	*Cyperus esculentus*	chufa flatsedge	✓	✓	✓	+
7	*Cytisus scoparius*	scotchbroom	✓	✓	✓	+
8	*Egeria densa*	Brazilian waterweed	✓	✓	✓	+
9	*Hypericum perforatum*	common St. Johnswort	✓	✓	✓	+
10	*Leucanthemum vulgare*	oxeye daisy	✓	✓	✓	+
11	*Myriophyllum aquaticum*	parrotfeather watermilfoil	✓	✓	✓	+
12	*Picris hieracioides*	hawkweed oxtongue	✓	✓	✓	+
13	*Solanum elaeagnifolium*	silverleaf nightshade	✓	✓	✓	+
14	*S. rostratum*[3]	buffalobur nightshade		✓	✓	+
15	*Soliva sessilis*	field burrweed	✓			+
16	*Sorghum halepense*	Johnsongrass	✓	✓	✓	+
17	*Spartium junceum*	Spanish broom	✓	✓	✓	+
18	*Tanacetum vulgare*	common tansy	✓		✓	+
19	*Tribulus terrestris*	puncturevine	✓	✓	✓	+
20	*Ulex europaeus*	common gorse	✓	✓	✓	+

[1] According to PLANTS
[2] Databases: PLANTS (USDA NRCS, 2004), Bishop (Bishop Museum, 2004), Manual (Wagner et al., 1999); latter two after PRER (2004)
[3] Eradicated from Hawaii in 1977

Conclusions

We found no exceptional risks related to the two proposals that justified a conclusion different from that given in the previous assessment (CPHST, 2006). A few mitigating factors seemed particularly noteworthy:

- The climate in Klickitat County is very different from that found in most Hawaiian cities;
- Hawaiian pest plant species of concern are already present in Washington State; and
- The risks from relevant diseases and pathogens seem likely to be effectively mitigated by the baling technology and other factors.

Overall, transportation of urban MSW from Hawaii to Roosevelt Regional Landfill in Washington State by PRER or HWS in airtight bales poses an insignificant risk of pest establishment.

Last, we note that only the pest risk associated with the proposals by PRER and HWS to move baled MSW from Hawaii to Washington State were addressed here. Complete approval of the proposal (pathway) or particular procedures should not be inferred. The pathway and proposal in question may still be subject to denial or modification, in whole or in part, based upon other constraints (pest or non-pest related), such as available resources or other Federal regulations.

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Appendix E. Risk of Introduction of Pests to Oregon via GRG from Hawaii.

United States
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Service

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The Risk of Introducing Pests to Gilliam County, Oregon via Hawaiian Plastic-Baled Municipal Solid Waste

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Executive Summary

Proposals to move waste to mainland landfills in airtight bales

This assessment focuses on proposed transport to a landfill in Oregon

Companies are proposing to transport large volumes of municipal solid waste (MSW) in airtight bales from Hawaii to landfills in the continental United States. In a previous general pest risk assessment, CPHST found that the risk of introduction of pests from Hawaii via this pathway was insignificant. Here we assess a proposal by Waste Management Disposal Services of Oregon, Inc., to transport baled MSW to the Columbia Ridge Solid Waste Landfill in Gilliam County, Oregon. Our objective is to determine if the proposal entails any exceptional risks, due to different procedures or the specific transport route or location of the landfill that would justify a different recommendation than was made for the general pathway.

Description of transport means and route

Low risk conveyances

Unsuitable climate

Few relevant quarantine pests

The company proposes to barge the baled MSW to one of two ports in Oregon: the primary location is Arlington (Gilliam Count); the alternative location is Rainier (Columbia County). Bales will be transported to the landfill by truck from Arlington and by rail from Rainer. All transportation methods are low risk. The local environments and climates for the two ports and the Gilliam Country landfill do not pose exceptional risks. The climate in Gilliam County is drier and much colder than that in most Hawaiian cities and should mitigate the risk from tropical and sub-tropical pests. The landfill is a modern facility that complies with relevant federal regulations. The environment of Columbia County is milder that Gilliam County. None of the relevant Federal or State quarantine plant pests, which include insects, mollusks, pathogens and invasive plants, was found to present an exceptional threat of surviving, escaping and establishing via this pathway.

Risk rating different than Low Risk not justified

This proposal largely followed the procedures outlined in the general pest risk assessment, and we found no factors that justified a pest risk rating other than Low risk. Transportation of baled Hawaiian MSW to Gilliam County, Oregon poses an insignificant risk of pest establishment. We recommend that the pathway be monitored to ensure that procedures and compliance do not differ significantly from what was described here and in the general pest risk assessment.

Introduction

Assess risk of plastic-baled waste from Hawaii

The Center for Plant Health Science and Technology (CPHST), at the request of Hawaii, conducted a general pest risk assessment to analyze the likelihood of introduction of pests into the continental United States via the transport of plastic-baled municipal solid waste (MSW) from Hawaii (CPHST, 2006). The MSW would be shredded, compressed, and wrapped in adhesive-backed, plastic film barriers made of low density polyethylene (LDPE), creating airtight packages. Bales would be transported by barge to a receiving facility on the mainland, moved by rail or truck to the landfills, and then buried intact in accordance with regulations for solid waste disposal (40CFR§258; EPA (1993)), with each company transporting perhaps 300,000 tons of MSW per year. A pest risk assessment was required because garbage from Hawaii cannot enter the continental United States under current federal regulations for plant pests (7CFR§330.400). The assessment dealt only with parts of the pathway expected to be valid for any company proposing to transport the baled waste.

General pest risk assessment had Low risk ratings for plant pests.

In the general pest risk assessment, CPHST (2006) concluded that, if the planned procedures were followed, transportation of baled Hawaiian MSW posed an insignificant risk of pest establishment. Reasons included exclusion of most yard and agricultural waste from the pathway to greatly reduce the presence of potential plant pests or propagules in the bales; inability of insects, mollusks, and most pathogens to survive in the bales; and establishment of pathway procedures (e.g. monitoring during transport) to protect against escapes via accidental ruptures and punctures during handling and transport. A qualitative risk analysis indicated that the cumulative risk ratings for the introduction of insects, mollusks, pathogens, and weeds were each Low.

Waste Management proposed shipping baled MSW from Hawaii to a landfill in Gilliam County, Oregon

Waste Management Disposal Services of Oregon, Inc. (Waste Management or WMDSO) has proposed moving baled MSW from Hawaii to the Columbia Ridge Solid Waste Landfill (CRL) in Gilliam County, Oregon. Bales will be transported by barge to either Rainier or Arlington, Oregon, and then by truck or rail to the landfill. The objective of this assessment is to assess whether any exceptional risk factors in the proposal warrant a recommendation other than the Low risk rating given in the general pest risk assessment (CPHST, 2006). Although a baling technology provider has not been decided upon by WMDSO, the procedures proposed by Waste Management (2005) for transporting baled MSW will closely follow the procedures evaluated by CPHST (2006). Specific items considered here include the destination landfill, the Federal and State quarantine pests of concern, the type(s) of transportation used to move bales after reaching the mainland, and any other notable factors in the proposal.

Definitions of key terms

Definition of 'garbage'

Garbage is defined as urban (commercial and residential) solid waste from Hawaiian municipalities. Based on company proposals to move baled MSW (not shown), this analysis assumes that yard and agricultural waste will be actively excluded from the waste stream.

Definition of a 'spill'

A **spill** is defined as the escape of waste material from a bale and contact with the ground, truck, tractor, barge, or other terrestrial feature.

Other definitions

Other important terms are defined as follows Merriam-Webster (2004):

Anaerobic: Living, active, occurring, or existing in the absence of free oxygen. The term only correctly applies to organisms, not non-living things like bales or the conditions within them

Anoxia: Hypoxia especially of such severity as to result in permanent damage

Anoxic: Greatly deficient in oxygen

Hypoxia: A deficiency of oxygen reaching the tissues of the body

Basic Proposal

Eight important details

Following are some important details from the proposal by Waste Management (2005).

Agricultural and yard waste separated

1) Agricultural and yard waste will be separated, or diverted to other disposal sites, so that it does not enter the pathway.

Bale specifications

2) The waste compression and baling system used will create rectangular bales weighing 2 to 3 tons, with a density of about 1600 to 2000 pounds per cubic yard (approx. 950 to 1200 kg/m^3). Densities should be about 1000 kg/m^3 (CPHST, 2006).

Bale staging conditions

3) WMDSO did not specifically state that bales would not be allowed to contact soil or other moist surfaces and to be distanced from vegetation, but they mentioned that bales would be kept in quarantine. New processing facilities built in

Hawaii, as well as unloading stations on the mainland, need to accommodate this requirement.

Shipping 120,000 tons annually

4) Estimated shipping an annual maximum of 120,000 tons (Willmann, 2007).

Two transportation route options

5) Bales will be moved up the Columbia River by barge, and then to the landfill by one of the following routes (Fig. 1):

Barge then truck

a) 210 miles up river to the Port of Arlington, Oregon (Gilliam County), then approx. 10 miles on truck and flatbed trailer to the landfill; or

Barge then rail

b) 52 nautical miles to a facility at Rainier, OR, near Portland, then approximately 130 miles by rail flatcar to the landfill.

Tracking bales

6) Track bales using an electronic manifesting system.

Monitor bales for damage

7) Monitor bales for ruptures and punctures, and patch ruptured bales when and where found.

Transport in industrial bags if repair is not possible

Proposed bagging spills differs from previous proposals, but rewrapping restaging will be required in Hawaii.

8) If patching is not possible, MSW proposed that bale will be contained and transported to the landfill in one or more industrial-grade bags (Super Sack®, B.A.G. Corp., Dallas, TX), with MSW inside 6-ml LPE liners. Liners will be hand-closed to create an airtight package (Willmann, 2005). The bales will need to be re-wrapped and re-staged if damage occurs in Hawaii. If the bale damaged is beyond patching and in route to Oregon or in Oregon, the bag protocol can be used. Though probably slightly inferior to re-baling, in terms of compression and forced evacuation of air, it offers the advantage of quickly collecting and sealing the MSW with less handling than if the MSW were put through the baling process again. As with bales (CPHST, 2006), the packages would be re-staged for several days before transport re-starts. If the clean-up, disinfection, and bag sealing procedures described in the Waste Management proposal (2005) are followed, we think the pest risk mitigation will be equally effective.

Destination landfill

Columbia Ridge Recycling and Landfill meets EPA guidelines

The CRL (www.wmnorthwest.com/landfill/landfillcities/columbia.html) in Gilliam County, near the town of Arlington (Fig. 2), is modern and meets regulations and EPA guidelines for design and operation, e.g. EPA (1993). We expect proper landfilling of bales at this site, and therefore the mitigation likely to come from landfilling seems valid (CPHST, 2006).

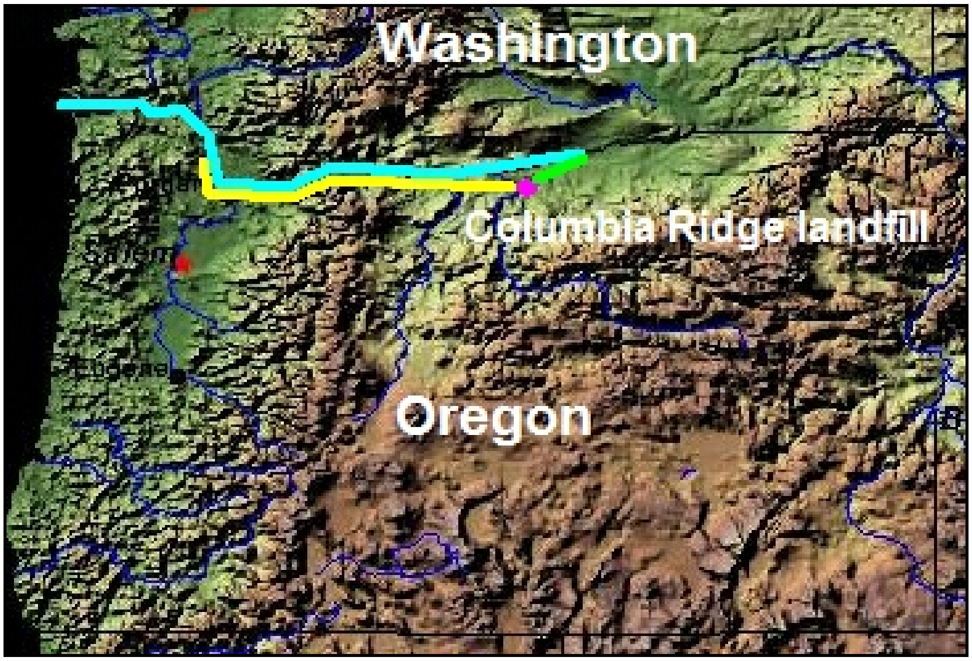

Figure 1. Map showing the transport route by barge (light blue), and either rail (yellow) or truck (green) for baled MSW to the Columbia Ridge Landfill in Oregon.

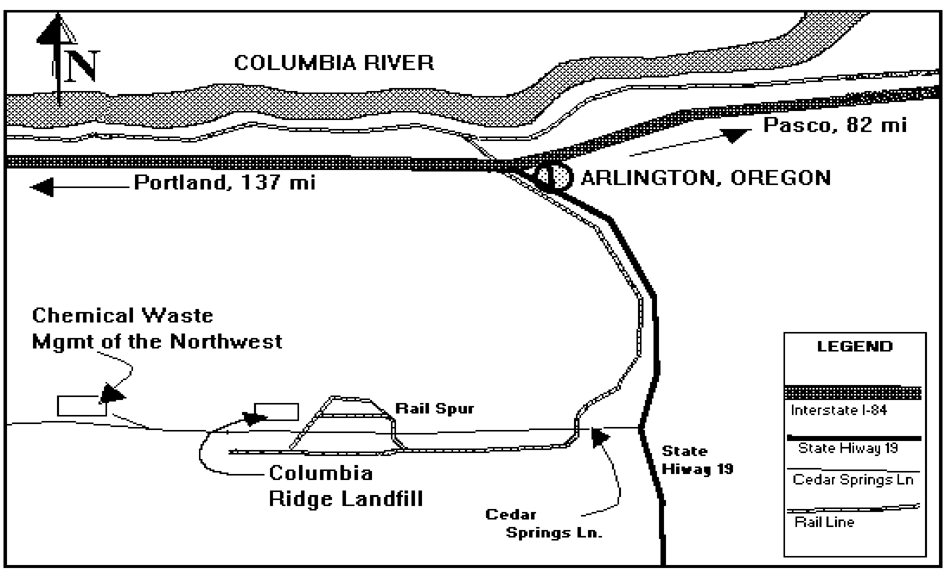

Figure 2. Map of Columbia Ridge Landfill and surrounding locations.

Transportation of bales

Quantitative risk for transportation modes and routes

As discussed above, bales will be barged up the Columbia River, and then moved either onto trucks or onto railcars (Willmann, 2007). The generic quantitative risk analysis for bale-rupturing accidents to transport of bales (CPHST, 2006) and modified (CPHST, 2007), Appendix A) was further adapted for the two routes proposed by Waste Management to the CRL. The proposed use of tandem tows (two barges towed inline) decreased the number of trips by half. The impact of accident rate on the tandem towing of barges was not examined. The two proposed routes and associated risks follow.

Tandem tows decrease number of trips

Main route option

Barge then truck

Unloading at the Willow Creek Barge Facility, Port of Arlington and trucking to the CRL requires an increase from 140 barge miles in the generic model to 210 miles, and a decrease in truck miles from 25 to 10.

Mean years to first bale-rupturing accident was 2,222 for trucks and 246 for barges

Low Risk route overall

The risk of any bale-rupturing accident for trucks was 0.00045, while that for barges was 0.0041. Mean years to the first bale-rupturing accident for trucks was 2,222, and that for barges was 246. We found a 95 percent chance that the first truck accident would occur only after 5444 years, or after 1391years for barge transport. The risk of catastrophic rupture of bales while they are being transported by truck or barge to CRL is therefore Low.

Alternate route option

Barge then rail

Unloading in Rainier, Oregon, and transporting by rail to CRL reduces rail miles in the model from 500 to 180, and barge distance from 140 to 52 nautical miles.

Mean years to first bale-rupturing accident was 2222 for trucks and 247 for barges

The risk of any bale-rupturing accident by train was 0.00002, while that for barges was 0.0077. Mean years to the first bale-rupturing accident for trains was 50,000.4, and for barges was 130. We found a 95 percent chance that the first train accident would occur only after 921 years, or after 554 years for barge transport. The risk of catastrophic rupture of bales while they are being transported by truck or barge to CRL is therefore Low.

Local environment and climate comparison to Hawaii

Climate in Hawaii

The tropical climate in Hawaii is characterized by relatively uniform day lengths and temperatures (Western Regional Climate Center, 2007). Annual climatic averages for Honolulu (Oahu) are maximum temperature = 84.0 °F, minimum temperature = 70.2 °F, and total precipitation = 20.7 inches (52.6 cm), while the same averages for Hilo (Hawaii) are maximum temperature = 81.2 °F, minimum temperature = 66.3 °F, and total precipitation = 128.2 inches (3.25 m) (Western Regional Climate Center, 2007).

Gilliam County lies in rain shadow

Gilliam County lies in the eastern rain shadow of the coastal Cascade Mountains (Department of Assessment and GIS, 2003). Mean annual precipitation is only about 15 inches (38 cm), and most falls during the winter (Taylor *et al.*, 2005). The mean (annual) daily maximum temperature in the county is 58.7 °F, and the mean daily minimum is 35.7 °F. That is about 20 °F less than the mean maximum temperatures in Hawaii, and about 30 °F less than the mean minimum temperatures. In addition, mean annual snowfall in the central part of Gilliam County is about 18 inches (45.7 cm; equal to approximately 4.6 cm of rainfall).

Climate is arid and cold in comparison to Hawaii

Thus, Gilliam County is drier and much colder than most municipalities in Hawaii. Most of the transport route (Fig. 1) is also in the rain shadow of the coastal range, and therefore would also be significantly drier and colder.

Local agriculture: Wheat predominate crop in the area

Gilliam County is in the main wheat-producing area of Oregon. Most acreage in the county is devoted to wheat, followed by forage and barley (National Agricultural Statistics Service, 2004). Apples, grapes and other irrigated crops are found in the northern part of the county.

Climate of Rainier based on Longview, WA,

Rainier is in Columbia County, OR. We used weather information for Longview, WA, which is directly across the Columbia River from Rainier. Rainier and Longview have climates which are more moist and mild than that of Arlington (Western Regional Climate Center, 2007). The annual climatic averages for Longview range from an average maximum temperature of 61.7 °F to an average minimum temperature of 41.8 °F (Western Regional Climate Center, 2007). The total annual precipitation averages 46.3 inches (18.2 cm), with an annual average snowfall of 4.9 inches (1.9 cm) (Western Regional Climate Center, 2007).

Annual precipitation at Rainier is similar to that of Hawaii

Though much colder than Hawaii, annual precipitation in Rainier is between the averages recorded for Honolulu and Hilo. Thus, compared to Arlington, the Rainier area poses a greater pest establishment risk. The proximity of Rainier to several protected wetlands and wildlife refuges also increases the potential environmental risk from hitchhikers from this route (EPA, 2007).

Potential plant pests

We expect a low incidence of pests in baled MSW

Quarantine plant pests from Hawaii include pathogens, mollusks, insects, and invasive plants (CPHST, 2006). We expect an extremely low incidence of these pests in Hawaiian municipal solid waste (CPHST, 2006). In addition to federal quarantines, Oregon has state plant pest quarantines in Gilliam County for apple maggot (603-052-0121), small broomrape (603-052-1025) and noxious weeds (603-052-1200).

Insects

Insects are highly unlikely to survive in bales

Of the insect pests of concern to the Oregon nursery industry, two, *Popillia japonica* (Japanese beetle) and *Homalodisca coagulata* (Say) (glassy winged sharpshooter), are present in Hawaii (Table 1). Some insects in Hawaii are Federal quarantine pests (Table 2). We do not discuss insects further since they are highly unlikely to survive in the bales (CPHST, 2006).

Invasive plants

Definition of category A noxious plant

In Oregon, Category "A" noxious plant species are defined as "Weeds of known economic importance which occur in the state in small enough infestations to make eradication or containment possible; or which are not known to occur, but their presence in neighboring states makes future occurrence in Oregon seem imminent" (Oregon Department of Agriculture, 2005). Only four of these Category "A" species are present in Hawaii, according to USDA NRCS (2004), Imada *et al*. (2007), Bishop Museum (2004), and Wagner *et al.* (1999). Those species are *Cyperus rotundus* L. (purple nutsedge), *Hydrilla verticillata* (hydrilla), *Pueraria lobata* (Willd.) Ohwi (kudzu), and *Solanum elaeagnifolium* Cav. (silverleaf nightshade).

Four category A noxious weeds present in Hawaii

Aquatic weed, Hydrilla

Hydrilla, an aquatic species, may present a risk to the Rainer, Oregon, area, but the arid conditions in Gilliam County would greatly mitigate the risk. Furthermore, hydrilla relies greatly on reproduction from leaf fragments (Kay and Hoyle, 2007), which would not be possible via this pathway because plant material would not survive in the bales.

Two other noxious weeds produce seed with low viability

Weed seed viability may be unaffected by bale conditions in general, but the seeds are highly unlikely to escape and contact a suitable growth environment. In addition, the kudzu (Susko *et al.*, 2001) and *Cyperus rotundus* (Justice and Whitehead, 1946) seeds only have about 10 percent viability. The vegetative nutlets of *C. rotundus* are produced in the soil, and therefore, are much less likely than seeds to be present in MSW. As in the PRA for Washington state (CPHST, 2005), the risk from invasive plants in baled MSW is Low.

Mollusks

Mollusks present concern as hitchhikers

Federal quarantine phytophagous snails occur in Hawaii (Robinson, 2006; Table 3) and may be a risk to hitchhike on bales. Mollusks have been detected in pre-departure and permitted cargo from Hawaii headed by air to the continental United States (AQAS, 2007), but not in maritime shipments, for which less inspection data is available. Smith and Fowler (2003) rated the risk for movement of *A. fulica* by cargo and empty containers as Low, partly because the large size of the snail facilitates detection. Contact of bales with moist substrates (Robinson, 2006), such as soil or mulch, increases the likelihood that mollusks can become established.

Suitability of climate

The climate in Oregon is suitable for at least one species, *Achatina fulica* (Smith and Fowler, 2003). We do not know if the climate is suitable for other species such as *C. aspersum*, but that species has been a problem pest in California for many years (Grafton-Cardwell *et al.*, 2005). Dispersal from there probably poses a greater risk.

C. aspersum already present in California

Proper staging and certification mitigates risk from mollusks

Staging bales on impermeable surfaces away from vegetation sources, and certification of bales by the company as mollusk-free (CPHST, 2006; Robinson, 2006) should make them Low Risk.

Plant pathogens

Some quarantine plant pathogens present in Hawaii

Some bacterial, fungal, and viral diseases of plants under Federal or Oregon quarantine are present in Hawaii and the pathogens could be transported (Tables 4 and 5). Oregon has a general pest quarantine against grapes (*Vitis* spp.) (excluding table grapes, *V. labrusca*), but we found no pathogens of grapes in Hawaii. For various reasons, the plant pathogens listed in Tables 4 and 5 are very unlikely to establish in Oregon via this pathway (Table 6).

Table 1. List of insect species of quarantine concern to the Oregon nursery industry (Oregon Department of Agriculture, 2006) with recorded presence in Hawaii (HDOA, 2004; Nishida (ed.), 2002).

Scientific Name	Common Name	Present in HI?
Conotrachelus nenuphar	Plum Curculio	No
Homalodisca coagulata	Glassy Winged Sharpshooter	Yes
Ostrinia nubilalis	European Corn Borer	No
Oulema melanopus	Cereal Leaf Beetle	No
Popillia japonica	Japanese Beetle	Yes
Rhagoletis mendax	Blueberry Maggot	No
Rhyacionia buoliana	European Pine Shoot Moth	No
Tomicus piniperda	Pine Shoot Beetle	No
Yponomeuta malinellus	Apple Ermine Moth	No

Table 2. Selected Federal quarantined insects present in Hawaii relevant to Oregon ecosystems.

Scientific name (Order: Family)	Common name	Reference[1]
Adoretus sinicus (Coleoptera: Scarabaeidae)	Chinese rose beetle	7 CFR§318.13
Adoretus sp.	–	7 CFR§318.60
Bactrocera cucurbitae (Diptera: Tephritidae)	melon fly	7 CFR§318.13
Bactrocera dorsalis (Diptera: Tephritidae)	Oriental fruit fly	7 CFR§318.13
Cactoblastis cactorum (Lepidoptera: Pyralidae)	cactus borer	7 CFR§318.13
Ceratitis capitata (Diptera: Tephritidae)	Mediterranean fruit fly	7 CFR§318.13
Coccus viridis (Hemiptera: Coccidae)	green scale	7 CFR§318.13
Chilo suppressalis (Lepidoptera: Crambidae)	Asiatic rice borer	7 CFR§318.13
Eriophyes gossypii (Acarina: Eriophyidae)	cotton blister mite	7 CFR§318.47
Euscepes postfasciatus (Coleoptera: Curculionidae)	sweet potato scarabee	7 CFR§318.30
Lampides boeticus (Lepidoptera: Lycaenidae)	bean butterfly	7 CFR§318.13
Maruca testulalis (Lepidoptera: Pyralidae)	bean pod borer	7 CFR§318.13
Omphisa anastomosalis (Lepidoptera: Pyralidae)	sweet potato stem borer	7 CFR§318.30
Pectinophora gossypiella (Lepidoptera: Gelechiidae)	pink bollworm	7 CFR§318.47
Phyllophaga spp. (Coleoptera: Scarabaeidae)	white grubs	7 CFR§318.60
Phytalus sp. (Coleoptera: Scarabaeidae)	white grubs	7 CFR§318.60
Sternochetus mangiferae (Coleoptera: Curculionidae) synonym: *Cryptorhynchus mangiferae*	mango seed weevil	7 CFR§318.13

[1] CFR = Code of Federal Regulations

Table 3. Federal quarantined and regulated mollusks present in Hawaii that are relevant to Oregon ecosystems.

Scientific name (Type: Family)	**Common name**	**Reference**
Achatina fulica Bowdich (Mollusca:Achatinidae)	giant African land snail	Cowie (1977; 2002b); Robinson, (2006)
Cornu aspersum (Müller) (Mollusca:Helicidae) [Syn. *Cryptomphalus aspersus* (Müller); *Helix aspersa* Müller]	brown garden snail	Cowie (1977; 2002b); Robinson (2006)
Laevicaulis alte (Férussac) (Mollusca:Veronicellidae)	tropical leatherleaf – thrives in arid biotopes	Cowie (1977; 2002b)
Meghimatium striatum (Hasselt) (Mollusca:Philomycidae)	a terrestial snail	Cowie (2002a); Robinson (2006)
Parmarion cf. *martensi* (Simroth) [tentative identification] (Mollusca:Helicarionidae)	a semi-slug; Carrier of the human parasitic nematode, *Angiostrongylus cantonensis*	Robinson (2006)
Paropeas achatinaceum (Pfeiffer) (Mollusca:Sublinidae)	a snail	Robinson (2006)
Pila ampullacea (Linné) (Mollusca:Ampullaridae)	"apple snail"	Robinson (2006)
Pila conica (Wood) (Mollusca:Ampullaridae)	"apple snail"	Robinson (2006)
Pila sp. (Mollusca:Ampullaridae)	"apple snail"	Robinson (2006)
Pomacea canaliculata (Lamarck) [1] (Mollusca:Ampullaridae)	channelled apple snail	Cowie (1977; 2002b); Robinson (2006)
Veroncella cubensis (Pfeiffer) (Mollusca:Veronicellidae)	two striped slug or Cuban slug	Cowie (1977; 2002b); Robinson (2006)

[1] Three other species occur in Hawaii, but this is the worst pest in that genus.

Table 4. Federal quarantined and regulated pathogens and nematodes present in Hawaii that are relevant to Oregon ecosystems.

Scientific name (Type: Family or Order)[1]	Common name	Reference
Meloidogyne konaensis (Nematoda: Meloidogynidae)	root-knot nematode	Zhang and Schmitt, (1994)
Xanthomonas albilineans (Ashby) Dowson (Bacterium: Xanthomonadales	sugarcane leaf scald	USDA-APHIS-PPQ, (2003)
X. axonopodis pv *vasculorum* (Cobb 1894) Vauterin, Hoste, Kersters & Swings Synonym: *X. vasculorum* (Bacterium: Xanthomonadales)	sugarcane gumming disease	USDA-APHIS-PPQ, (2003)

[1]Family is listed for nematodes; Order is listed for bacteria.

Table 5. Plant pathogens and parasitic nematodes of concern in Oregon (Division of Plant Industries, 2005), and present in Hawaii (CABI, 2005; Raabe *et al.*, 1981; University of Hawaii and Hawaii Department of Agriculture, 2004; USDA-APHIS-PPQ, 2003).

Scientific name	Common name
Bean common mosaic virus (strain US-6)[2,4]	bean common mosaic virus
Colletotrichum truncatum[4]	lentil anthracnose
Colletotrichum lindemuthianum[1,3,4]	bean anthracnose
Curtobacterium flaccumfaciens pv *flaccumfaciens*[2,3,4]	bacterial wilt of beans
Ditylenchus dipsaci (onion race)[5]	onion stem and bulb nematode
Fusarium graminearum[2,5]	wheat scab
Phakopsora pachyrhizi[4]	soybean rust
Phytophthora infestans[5]	potato late blight
Pseudomonas savastanoi pv *phaseolicola*[2,3,4] synonym: *P. syringae* pv *phaseolicola*	halo blight of beans
Pseudomonas syringae pv *syringae*[2,3,5]	bacterial brown spot of beans
Sclerotium cepivorum[2,3,5]	onion white rot
Xanthomonas axonopodis pv *phaseoli* [3,4] synonym: *X. campestris* pv *phaseoli*	common blight of beans

[1] Reported present in Hawaii (CABI, 2005) and under control in Malheur County by Oregon Department of Agriculture ((2007) (Oregon Revised Statutes (ORS) 570.405 to 570.435).
[2] Reported present in Oregon by CABI (2005). Bean diseases are under control in Malheur County by Oregon Department of Agriculture (2007) (ORS 570.405 to 570.435).
[3] Pests of moderate to high concern.
[4] Not known to occur or not detected in Oregon.
[5] Limited distribution or newly established.

Table 6. Rationales for pathogens being low risk for introduction and establishment in Oregon via baled solid waste from Hawaii.

Common/scientific name	Rationale for low risk rating
bacterial brown spot of beans bacterial wilt of beans common blight of beans halo blight of beans sugarcane gumming disease sugarcane leaf scald	▪ Aerobic bacteria need oxygen (Wener, 2005) and are unlikely to survive in bales
bean anthracnose lentil anthracnose	▪ Primarily seedborne (CABI, 2005), so unlikely to be present in the bale or to disperse after escape ▪ Dormant agents may require oxygen
bean common mosaic virus (strain US-6)	▪ Seedborne and aphid-vectored (CABI, 2005); aphids cannot survive and infected seeds are unlikely to be present ▪ Only multiplies in living cells ((Agrios, 2005)) and suitable host plants would either not enter or survive in the bales
onion stem and bulb nematode	▪ Needs oxygen for survival ▪ Seedborne (CABI, 2005), so unlikely to be present or to disperse after escape ▪ Most stages need host material for survival (CABI, 2005) ▪ Fourth stage juveniles survive for years without a host, but populations decline rapidly (CABI, 2005) and are not likely to survive other bale conditions (e.g., compression, anoxia)
onion white rot	▪ Fungus is unlikely to survive anoxic conditions in the bale ▪ Dormant sclerotia germinate only in the presence in soil of specific root exudates from *Allium* spp. (CABI, 2005)
potato late blight	▪ Dormant agents may need oxygen for survival ▪ Except for oospores, a living host or crop debris is required for survival (CABI, 2005), which are unlikely to be present or to survive in the bales ▪ The asexual stage only occurs in contact with living host material (Agrios, 2005; CABI, 2005), which is unlikely to be present in the pathway
root-knot nematode	▪ Dormant agents may need oxygen for survival ▪ Cool temperatures are expected to kill eggs (Schmitt, 2002) ▪ Nematode has limited tolerance to changes in temperature (prefers 75±10 °F), so climatic conditions in Oregon would probably prevent long-term establishment (Schmitt, 2002) ▪ Dispersal is primarily via roots and tubers, or by field equipment (Agrios, 2005), which are both unlikely to occur
soybean rust	▪ Obligate parasite can only survive on live plant material, which would not survive in the bales
wheat scab	▪ Seedborne; requires host material for survival (CABI, 2005), which is very unlikely to be present ▪ Needs oxygen for survival

Conclusions

We found no exceptional pest risks

We found no significant exceptional pest risks related to the WMDSO proposal to take baled MSW to the CRL that justified a conclusion different from that given in CPHST (2006).

Three notable mitigating factors

A few mitigating factors seemed particularly noteworthy:

- The climate in Gilliam County is very different from that of Hawaii;
- Very few relevant invasive plant species in Oregon are present in Hawaii; and
- The risks from relevant diseases and pathogens seem likely to be effectively mitigated by the bale technology and other factors.

Overall Low Risk of pest establishment

Overall, transportation of urban solid waste from Hawaii to the CRL in Oregon by WMDSO in plastic-wrapped, airtight bales poses a **Low risk** of pest establishment. Perhaps the greatest pest risk is from hitchhikers, so we strongly recommend that bales be certified mollusk-free by the company (subject to audit by USDA APHIS).

Both routes with conveyances were Low risk for bale-rupturing accidents

The two routes proposed, barge plus truck or barge plus rail, were both Low risk for accidents. However, in the alternate route the unloading site of Rainier, Oregon, has a milder climate and represents an increased possibility of establishment by hitchhiking mollusks and other pests.

This assessment only dealt with pest risks

The pathway may be disallowed for other reasons

Last, we only addressed the pest risk associated with the proposal by WMDSO to move baled MSW from Hawaii to Oregon. Complete approval of the proposal (pathway) or particular procedures should not be inferred. The pathway and proposal in question may still be subject to denial or modification, in whole or in part, based upon other constraints (pest or non-pest related), such as available resources or other State or Federal regulations.

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Appendix F. Risk of Introduction of Pests to Idaho via GRG from Hawaii.

United States
Department of
Agriculture

Animal and Plant
Health Inspection
Service

September 2007

The Risk of Introducing Pests to Elmore County, Idaho, via Plastic-Baled Municipal Solid Waste from Hawaii

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Executive Summary

Proposals to move waste to mainland landfills in airtight bales

Companies are proposing to transport large volumes of Hawaiian municipal solid waste (MSW) in airtight bales to landfills in the continental United States. In a previous general pest risk assessment, CPHST found that the risk of introducing pests from Hawaii via this pathway was insignificant. The following is an assessment of a proposal by Idaho Waste Systems, Inc. to transport baled MSW to the Simco Road Regional Landfill in Elmore County, Idaho. The landfill is a modern facility that complies with all relevant federal regulations. Our objective was to determine if the proposal entails any exceptional risks, due to different procedures or the specific transport route or location of the landfill, that would justify a different recommendation than was made for the general pathway.

This assessment is for proposed transport to Idaho

This proposal closely follows the procedures for waste processing, bale creation, monitoring, and transport outlined in the general pest risk assessment. The company proposes to barge the baled MSW to the mainland for unloading at Rainier, Oregon. Bales will be transported directly to the landfill by rail. The transportation methods to be used are low risk for accidents that might rupture bales.

Description of transport means and route

In addition, the climate in Elmore County is much drier and colder than that in Oahu, which will mitigate against many possible introductions of subtropical Hawaiian pests.

Unsuitable climate

We found 44 Federal or State quarantine plant pests relevant to this pathway. These included 19 insects, 16 pathogens and nematodes, two mollusks, and nine invasive plants. None of them posed an exceptional threat—i.e., factors enabling special means of escaping or dispersing, or an enhanced likelihood of establishment—of introduction and establishment via this pathway.

No exceptional factors favoring pest establishment

In conclusion, we found no factors that justified a different pest risk finding than the **Low Risk** rating given in the general risk assessment. The transportation of baled MSW from Hawaii to Elmore County, Idaho, poses an **insignificant risk of pest establishment**. We recommend that the pathway be monitored to ensure that procedures and compliance do not differ significantly from what was described in this document and in the general pest risk assessment.

Risk rating different than Low Risk not justified

Introduction

General pest risk assessment done in 2005

A general pest risk assessment was done by the Center for Plant Health Science and Technology (CPHST) at the request of Hawaii to assess the likelihood of introduction of pests into the continental United States via the transport of Hawaiian plastic-baled municipal solid waste (MSW) (CPHST, 2005a). In the baling process MSW is compressed and wrapped in adhesive-backed, plastic film barriers made of low density polyethylene (LDPE), creating airtight packages. Bales are then transported by barge to a receiving facility on the mainland, taken to landfills by rail or truck, and buried (intact) in accordance with solid waste disposal regulations (40CFR§258; EPA (1993). The assessment dealt with parts of the pathway applicable to all companies proposing to transport baled MSW. A pest risk assessment was necessary because garbage from Hawaii cannot enter the continental U.S. under current federal regulations for plant pests (7CFR§330.400).

High-density, airtight bales

Previous finding was insignificant pest risk

CPHST concluded that, if the general procedures described were followed, the transportation of baled MSW from Hawaii posed an insignificant risk of pest introduction and establishment (CPHST, 2005a) for the following reasons:

Factors contributing to low risk for the pathway

- the exclusion of most yard and agricultural waste from the pathway would reduce the presence of potential plant pests or propagules in the bales
- insects and some pathogens are unlikely to survive in the bales
- other pathway procedures (*e.g.*, monitoring during transport) would adequately protect against escapes via accidental ruptures and punctures during handling and transport

Low Risk ratings given to pest introductions

Qualitative risk analysis indicated that the cumulative risk ratings for the introduction of insects, pathogens, and weeds were Low.

New proposal for Idaho

Idaho Waste Systems, Inc. has proposed moving baled MSW from Hawaii to the Simco Road Regional Landfill in Elmore County, Idaho. Bales will be transported by barge to Rainier, Oregon, and then by rail to the landfill. The objective of this assessment is to evaluate the proposal by Idaho Waste Systems to determine if any exceptional risk factors exist to warrant a risk rating greater than Low. Although a specific baling technology provider has not been designated by Idaho Waste Systems, the proposed procedures for baling and transporting the MSW (Idaho Waste Systems, 2005) closely follow those evaluated by CPHST (2005a). Specific items considered include the destination landfill, Federal and State quarantine pests of concern, the type(s) of transportation used to move bales after reaching the mainland, and other notable factors in the proposal.

Objective is to find exceptional risk factors

Site-specific factors considered

Definitions of key terms

Definition of 'garbage'

Garbage is defined (CPHST, 2005a) as urban (commercial and residential) solid waste from municipalities in Hawaii (e.g., Honolulu, Hilo). Based on proposals to move baled waste, we assumed in this analysis that the company will actively exclude yard and agricultural waste from the waste stream.

Definition of 'spill'

A spill is defined as the escape of waste material from a bale, and contact with the ground, truck, tractor, barge, or other terrestrial features.

Other definitions

Other important terms are defined as follows (Merriam-Webster, 2004):

Anoxia: Hypoxia especially of such severity as to result in permanent damage

Anoxic: Greatly deficient in oxygen

Hypoxia: A deficiency of oxygen reaching the tissues of the body

Anaerobic: Living, active, occurring, or existing in the absence of free oxygen. The term applies to living organisms, not those that are non-living, like bales, or the conditions within them

Proposal review

Eleven important details from the proposal

Idaho Waste Systems (2005) indicated the following important details in their proposal:

Diversion of some waste

1) Agricultural and yard waste will be diverted to other disposal sites or separated from conveyors belts as it enters processing so that yard waste does not enter the pathway: the goal will be to achieve 3 percent or less yard waste entering the waste stream

Volume will increase in time

2) The company plans to start transporting about 5,000 tons of baled MSW monthly, or 60,000 tons annually, but to increase that over time to the full barge capacity available, which would mean 30,000 tons monthly, or 360,000 tons annually (Gauthier, 2006)

Baling system details

3) The waste compression and baling system (Macpresse solid waste baler, model MAC 112; Idaho Waste Systems, 2005) will create rectangular bales weighing about 1.7 tons, with densities from about 1,000 to 1,500 lbs to per cubic yard (approx. 640 to 880 kg/m^3) (Harris, 2005). Total thrust produced is equal to 440,000 pounds, or 235 psi, which

Staging and storage

4) Any imperfectly sealed bales found during staging in Hawaii will be rewrapped and re-staged.

5) Any stored bales will be kept on hard, impervious surfaces, at least 100 ft from any vegetation or agricultural product

Transportation route

6) Bales will be moved to the mainland and up the Columbia River

by barge to a facility near Rainier, Oregon (Columbia County) (Fig. 1), unloaded, and then moved to the landfill by rail, a distance of 550 miles (distance estimated as Longview, WA, to Simco, ID) (Union Pacific Railroad Corp., 2006)

Direct loading onto railcars

7) The company plans to move bales from the barge directly onto rail cars, to reduce handling

Manifesting system

8) Bales will be tracked with an electronic ("chain-of-custody") manifesting system

Company inspections

9) Bales will be inspected by the company for ruptures and punctures at each handling point. An organic vapor analyzer/meter will be used to detect waste decomposition gases that would escape if a puncture or rupture allowed oxygen to re-enter the bale

Bale repairs

10) Broken or ruptured bales will be patched or repaired when and where found. Bales will be repaired if ruptures are 6 inches long or less; otherwise they will be rewrapped at a mainland baling facility

Bales monofilled at the landfill

11) Bales will be segregated, or "monofilled," in the landfill to allow careful handling and to avoid waste compacting operations used for daily deliveries of regular MSW

Use of vapor meters could be an improvement

In regard to item (5), we could not fully evaluate the effectiveness of the organic vapor meter; however, if it is sufficiently sensitive and properly used it could improve visual detection of small breaches.

Restaging repaired bales is not necessary

Also note that for item (10) above, restaging is not necessary since the initial staging in Hawaii would have met the requirement. At this point, getting the bale to the landfill quickly is proper.

Bales palletized from Hawaii to Oregon

Forklifts may reduce the drop rate but increase the likelihood of punctures

The company will handle the bales on pallets in Hawaii and while barging them to the mainland. The pallets are the type used for newsprint, wooden, with features (e.g., rounded edges, sanded planks) designed to avoid snagging or tearing (Gauthier, 2007). One pallet has the capacity for four bales, which will minimize the number of handling operations required, but expose four bales to a single accident. Furthermore, the use of standard forks will expose bales to accidental punctures and rips. If necessary, the company will strap the bales together or to the pallets. Palletized bales probably will be handled using lift trucks with standard forks, or cranes, which increases the likelihood for bale punctures. After off-loading in Oregon, bales will be separated from the pallets and handled using lift trucks with clamp-type arms.

Destination landfill

Proposed landfill

Simco Road Regional Landfill (http://www.idahowaste.com/ simco.html) is in Elmore County, about 30 miles southeast of Boise. It is a modern facility that meets regulations and EPA guidelines for design and operation (e.g., EPA, 1993). We have no reason to believe that bales will not be properly landfilled at this site; therefore, the mitigation likely to come from landfilling (CPHST, 2005a) is valid.

Alternate landfill

Rail travel to Idaho from the west may sometimes close during the winter . In that case, the company has proposed to deliver the bales to the Columbia Ridge Solid Waste Landfill in Gilliam County, Oregon (http://www.wmnorthwest.com/landfill/landfillcities/ columbia.html), near the town of Arlington. As above, it is a modern facility meeting all regulations and EPA guidelines. The environment of the alternate landfill poses no exceptional pest risks (CPHST, 2007).

Transportation of bales

Bales moved 60 miles by barge

1,429 years to the first bale-rupturing barge accident

Bales will be barged 60 miles up the Columbia River, and off-loaded onto railcars at Rainier, OR. Based on data on the number of freight barge accidents from 2000 to 2005, and estimates of the mean number of miles freight was moved, the mean barge accident rate was 0.000575 per mile (Appendix A). The mean annual probability of a bale-rupturing barge accident was 0.0007 (0.07 percent). This gave a mean of 1,429 years to the first bale-rupturing accident, with only a 5 percent chance of happening within 74 years.

550 miles by rail to Idaho

385 years to the first bale-rupturing rail accident

The trip by rail to the landfill is 550 miles. Like barges, rail transport has a very low accident rate: the mean rate from 1996 to 2006 was 3.92 accidents per million rail miles (Appendix A). From that rate and other parameters, the annual probability of a bale-rupturing train accident was 0.0005 at the beginning of service, and 0.0026 (0.26 percent) after the anticipated increase in volume. Accordingly, the estimated means for years to the first bale-rupturing accident were 2000 years at the beginning, and 385 years after the increase. In addition, even in the latter case, there is only a 5 percent chance of that accident happening within 20 years.

Only 180 rail miles to alternate landfill site

If transported by rail to the Columbia Ridge Landfill from Rainier, the barge miles would not change, while rail distance would decrease to 180 miles. We assumed this would only affect trips 25 percent of the time (3 mos. out of 12). Given this, the risk of any bale-rupturing rail accident was 0.035 percent under the starting MSW amounts, and 0.235 percent for future amounts. Mean years to the first bale-rupturing accident for trains was 2,857 at start, and 426 in the future.

426 years to the first bale-rupturing rail accident

We found a 95 percent chance that the first train accident would occur only after 147 years at start, and after 22 years with the increased amounts. Using the landfill in Oregon would decrease the risk somewhat, because fewer rail miles would be traveled.

Local environment

Elmore County is very arid

Northern Elmore County is mountainous, while the southern portion—where the landfill is located—slopes down to the Snake River. The area is "a relatively parched environment" (Schlosser, 2004) that supports drought-tolerant sagebrush and grasses (Fig. 2).

Major crops are livestock and pasture/forage

Elmore County is primarily a livestock and pasture/forage area (National Agricultural Statistics Service, 2002). Other crops grown include sugar beets, potatoes, wheat, and fresh market vegetables.

Climate

Hawaii: Mild climate, no freezing

Hawaii's tropical climate is characterized by relatively uniform day lengths and temperatures (National Weather Service, 1983). Annual climatic averages for Honolulu (Island of Oahu) are maximum temperature = 88.0 ºF, minimum temperature = 74.4 ºF, and total precipitation = 20.75″ (Western Regional Climate Center, 2005a).

Idaho is much drier and much colder

Short growing season

Elmore County is significantly drier and colder than Oahu. Mean annual precipitation is only about 10″, most of which falls as snow from November to February (Western Regional Climate Center, 2005b). Mean daily minimum temperature in the county is 36.7 °F, and the mean daily maximum is 64.8 °F. Mountain Home, near the landfill, has about 150 days a year in which the temperature drops below freezing, 32 deg F. The growing season is only about 135 days.

Transport route mostly has climate like SW Idaho

Most of the transport route (Fig. 1) is also in the rain shadow of the coastal range, and would be significantly drier than Oahu, and colder as well.

Potential plant pests

Very low pest incidence in MSW

Quarantine plant pests for Idaho include insects, pathogens, mollusks, and invasive plants. We expect an extremely low incidence of these pests in typical MSW.

Insects

Only species of concern are federal quarantine insects

No insects of concern for Idaho (http://www.agri.state.id.us/Categories/PlantsInsects/RegulatedAndInvasiveInsects/Insectpestwatchlist.php) are present in Hawaii except for federally quarantined pests (Table 1). Insects are Low Risk because they cannot survive inside the bales (CPHST, 2005a); we do not discuss them further here.

Pathogens

Risk from both federal and state quarantine pests

Bacterial, fungal, nematode and viral diseases of plants under Federal or Idaho quarantine are present in Hawaii and can be transported (Tables 2 and 3). For various reasons, these organisms are unlikely to establish in Idaho via this pathway (Table 4).

Invasive plants

Many Idaho noxious weeds are already present and widespread

The state list of noxious weed species for Idaho includes species that are often already widespread (Division of Plant Industries, 2007a). Consequently, few of the listed species have limited distributions and would be a concern. Nine noxious weed species categorized as ‘Early Detection-Rapid Response’ represent the most risk (Table 5). Only three are reported as present or cultivated in Hawaii: *Egeria densa* (Brazilian elodea), *Eichhornia crassipes* (water hyacinth), and *Hydrilla verticillata* (hydrilla) (Bishop Museum, 2002; Imada *et al.*, 2007). All three species are aquatic, and the arid conditions in southwest Idaho would greatly mitigate the risk from all three species. Furthermore, two of them—elodea and hydrilla—rely greatly on reproduction from leaf fragments (Kay and Hoyle, 2007a, 2007b), which would not be possible via this pathway because plant material would not survive in the bales. As in the PRA for Washington state (CPHST, 2005b), the risk from invasive plants in baled MSW is Low.

Three relevant noxious weeds are present in HI

Risk mitigating factors include aquatic habit and unsuitable means of reproduction

Mollusks

No risk in baled MSW, but potential risk as hitchhikers

Generally, mollusks in baled MSW pose no risk because they would be killed by either compression or hypoxia. They may pose risks as hitchhikers on the outside of bales, however (CPHST, 2006; Robinson, 2006). Unfortunately, in this proposal the planned use of pallets to transport the bales increases the likelihood that hitchhiking mollusks could follow the pathway. Pallets provide better cover and will be more difficult to inspect than the plain surfaces of the bales.

Pallets increase the likelihood of hitchhikers

Four of six Idaho-regulated species are not present in Hawaii

The regulated list of mollusks for Idaho has six species (Division of Plant Industries, 2007b). Four are not present in Hawaii, but the others—*Achatina fulica* (giant African snail), and *Cornu aspersum* (brown garden snail) (Bishop Museum, 2004b)—are among several Federal quarantine phytophagous snails that occur in Hawaii (Robinson, 2006) and might hitchhike on bale exteriors (Table 6).

Risk mitigating factors

Smith and Fowler (2003) rated the risk for movement of *A. fulica*, by cargo and empty containers as low, partly because its large size would facilitate detection. Moreover, except for the off-loading point

Unsuitable climate for giant African snails in Idaho

C. aspersum already present in nearby California

in Oregon, weather-based mapping indicated that Idaho and eastern Oregon are not suitable for *A. fulica* establishment (Smith and Fowler, 2003). We do not know if the climate is suitable for other species such as *C. aspersum*, but that species has been a problem pest in California for many years (Grafton-Cardwell *et al.*, 2005). Dispersal from there probably poses a greater risk.

Inspection and proper staging should reduce the risk

If bales are inspected and certified to be mollusk-free, and if they do not contact moist substrates, such as soil or mulch, before departure from Hawaii, the pathway should be low risk (Robinson, 2006). We strongly recommend that this inspection and certification be required and implemented. Likewise, the staging area for bales in Hawaii should always be on an impervious surface, and should be appropriately distant from vegetation to reduce the likelihood of snails being present (CPHST, 2006).

Figure 1. Map showing barge (light blue) and rail (yellow) transport route for baled MSW to the Simco Road Regional Landfill in Idaho.

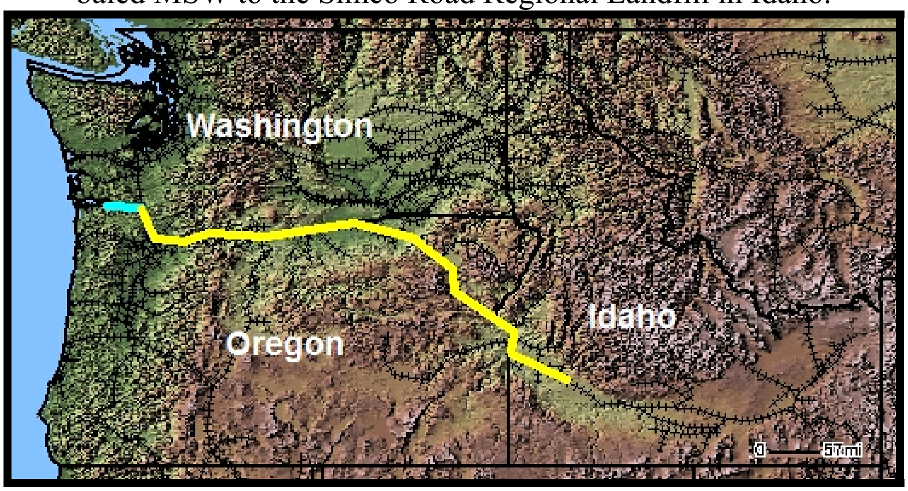

Figure 2. Sagebrush-dominated plant community typical of Southwest Idaho

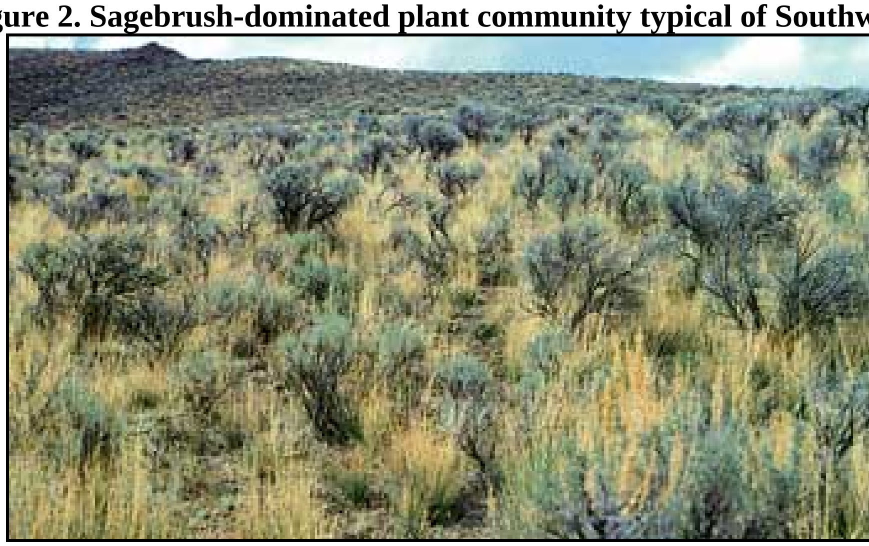

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Table 1. Federally quarantined insects present in Hawaii and potentially relevant to Idaho ecosystems.

Scientific name (Order: Family)	Common name	Reference[1]
Aceria litchi (Acarina: Eriophyidae) synonym: *Eriophyes litchi*	litchi rust mite, litchi gall mite	Chia et al. (1997), USDA-APHIS (2005)
Adoretus sinicus (Coleoptera: Scarabaeidae)	Chinese rose beetle	7 CFR§318.13
Adoretus sp.	–	7 CFR§318.60
Bactrocera cucurbitae (Diptera: Tephritidae)	melon fly	7 CFR§318.13
Bactrocera dorsalis (Diptera: Tephritidae)	Oriental fruit fly	7 CFR§318.13
Cactoblastis cactorum (Lepidoptera: Pyralidae)	cactus borer	7 CFR§318.13
Ceratitis capitata (Diptera: Tephritidae)	Mediterranean fruit fly	7 CFR§318.13
Coccus viridis (Hemiptera: Coccidae)	green scale	7 CFR§318.13
Chilo suppressalis (Lepidoptera: Crambidae)	Asiatic rice borer	7 CFR§318.13
Eriophyes gossypii (Acarina: Eriophyidae)	cotton blister mite	7 CFR§318.47
Euscepes postfasciatus (Coleoptera: Curculionidae)	sweet potato scarabee	7 CFR§318.30
Lampides boeticus (Lepidoptera: Lycaenidae)	bean butterfly	7 CFR§318.13
Maconellicoccus hirsutus[2] (Hemiptera: Pseudococcidae)	pink hibiscus mealybug	CABI (2005), USDA-APHIS-PPQ (1996)
Maruca testulalis (Lepidoptera: Pyralidae)	bean pod borer	7 CFR§318.13
Omphisa anastomosalis (Lepidoptera: Pyralidae)	sweet potato stem borer	7 CFR§318.30
Pectinophora gossypiella (Lepidoptera: Gelechiidae)	pink bollworm	7 CFR§318.47
Phyllophaga spp.	white grubs	7 CFR§318.60
Phytalus sp.	white grubs	7 CFR§318.60
Sternochetus mangiferae (Coleoptera: Curculionidae) synonym: *Cryptorhynchus mangiferae*	mango seed weevil	7 CFR§318.13

[1] CFR = Code of Federal Regulations

[2] This pest is established in California, Florida and Hawaii and is under biological control (Meyerdirk, 2004), but not official control. (Official control is defined as "the active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures with the objective of eradication or containment of quarantine pests" (IPPC, 2001).) Thus, it does not fit the IPPC definition of a quarantine pest: "A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled" (IPPC, 2001).

Table 2. **Federally quarantined pathogens in Hawaii that are relevant to Idaho ecosystems.**

Scientific name (Order: Family)	Common name	Reference
Meloidogyne konaensis (Nematoda: Meloidogynidae)	root-knot nematode	Zhang and Schmitt (1994)
Phakopsora pachyrhizi (Uredinales: Phakopsoraceae)	soybean rust	USDA-APHIS-PPQ, 2003; USDA-APHIS-PPQ, 2005
Xanthomonas albilineans (Xanthomonadales: Xanthomonadaceae)	sugarcane leaf scald	USDA-APHIS-PPQ, 2003
X. axonopodis pv *vasculorum* (Xanthomonadales: Xanthomonadaceae) Synonym: *X. vasculorum*	sugarcane gumming disease	USDA-APHIS-PPQ, 2003

Table 3. **Plant pathogens and parasitic nematodes of concern in Idaho (Division of Plant Industries, 2005), and that are present in Hawaii (CABI, 2005; Raabe et al., 1981; University of Hawaii and Hawaii Department of Agriculture, 2004; USDA-APHIS-PPQ, 2003).**

Category	Scientific name	Common name
Not known to occur or not detected in the state		
	Bean common mosaic virus[1] (strain US-6)	bean common mosaic virus
	Colletotrichum truncatum	lentil anthracnose
	Colletotrichum lindemuthianum[1]	bean anthracnose
	Curtobacterium flaccumfaciens pv *flaccumfaciens*[1]	bacterial wilt of beans
	Phakopsora pachyrhizi	soybean rust
	Pseudomonas savastanoi pv *phaseolicola*[1] synonym: *P. syringae* pv *phaseolicola*	halo blight of beans
	Xanthomonas axonopodis pv *phaseoli* synonym: *X. campestris* pv *phaseoli*	common blight of beans
Limited distribution or newly established		
	Ditylenchus dipsaci (onion race)	onion stem and bulb nematode
	Fusarium graminearum	wheat scab
	Phytophthora infestans	potato late blight
	Pseudomonas syringae pv *syringae*	bacterial brown spot of beans
	Sclerotium cepivorum[2]	onion white rot

[1] Reported as present in Idaho (CABI, 2005).
[2] Pests of moderate to high concern.

Table 4. Rationales for pathogens being Low Risk for introduction and establishment in Idaho via baled solid waste from Hawaii.

Common/scientific name	Rationale for Low Risk rating
▪ bacterial brown spot of beans ▪ bacterial wilt of beans ▪ common blight of beans ▪ halo blight of beans ▪ sugarcane gumming disease ▪ sugarcane leaf scald	▪ Aerobic bacteria need oxygen and are unlikely to survive in bales ▪ Free bacteria have lower survival rates, i.e., when not in contact with suitable host material (Agrios, 2005)
▪ bean anthracnose ▪ lentil anthracnose	▪ Primarily seedborne (CABI, 2005), so it is unlikely to be present in the bale or to disperse after escape ▪ Dormant agents may require oxygen
▪ bean common mosaic virus (strain US-6)	▪ Seedborne and aphid-vectored (CABI, 2005); aphids cannot survive and infected seeds are unlikely to be present ▪ Only multiplies in living cells (Agrios, 1997) and suitable host plants; would not enter or survive in the bales
▪ onion stem and bulb nematode	▪ Needs oxygen for survival ▪ Seedborne (CABI, 2005), so it is unlikely to be present or to disperse after escape ▪ Most stages need host material for survival (CABI, 2005) ▪ Fourth stage juveniles survive for years without a host, but populations decline rapidly (CABI, 2005) and are not likely to survive other bale conditions (e.g., compression, anoxia)
▪ onion white rot	▪ Fungus is unlikely to survive anoxic conditions in the bale ▪ Dormant sclerotia germinate only in soil in the presence of specific root exudates from *Allium* spp. (CABI, 2005)
▪ potato late blight	▪ Dormant agents may need oxygen for survival ▪ Except for oospores, a living host or crop debris is required for survival (CABI, 2005), which are unlikely to be present or to survive in the bales ▪ The asexual stage only occurs with contact to living host material (Agrios, 2005; CABI, 2005), which is unlikely to be present in the pathway
▪ root-knot nematode	▪ Dormant agents may need oxygen for survival ▪ Cool temperatures are expected to kill eggs (Schmitt, 2002) ▪ The nematode has limited tolerance to temperature change (prefers 75±10 °F), so climatic conditions in Idaho would probably prevent long-term establishment (Schmitt, 2002) ▪ Dispersal is primarily via roots and tubers, or by field equipment (Agrios, 2005), which are both unlikely to occur
▪ wheat scab	▪ Seedborne; requires host material for survival (CABI, 2005), which is both unlikely to be present and to survive ▪ Needs oxygen for survival

Table 5. Idaho noxious weeds classified as 'Early Detection-Rapid Response', with scientific and common names and reported presence or cultivation in Hawaii.

Scientific Name	Common Name	Present [1]	Cultivated [2]
Centaurea squarrosa	squarrose knapweed	No	No
Eichhornia crassipes	water hyacinth	**Yes**	**Yes**
Egeria densa	Brazilian elodea	**Yes**	**Yes**
Heracleum mantegazzianum	giant hogweed	No	No
Hieracium glomeratum	yellow devil hawkweed	No	No
Hieracium piloselloides	tall hawkweed	No	No
Hydrilla verticillata	hydrilla	No	**Yes**
Impatiens glandulifera	policeman's helmet	No	No
Zygophyllum fabago	Syrian beancaper	No	No

[1] Bishop Museum (2004a)
[2] Imada *et al*. (2007)

Table 6. **Federal quarantined and regulated mollusks present in Hawaii that may be relevant to Idaho ecosystems.**

Scientific name (Type: Family)	Common name	Reference
Achatina fulica Bowdich (Mollusca: Achatinidae)	giant African land snail	Cowie (1977; 2002b); Robinson (2006)
Cornu aspersum (Müller) (Mollusca: Helicidae) [Syns. *Cryptomphalus aspersus* (Müller); *Helix aspersa* Müller]	brown garden snail	Cowie (1977; 2002b); Robinson (2006)
Laevicaulis alte (Férussac) (Mollusca: Veronicellidae)	tropical leatherleaf	Cowie (1977; 2002b)
Meghimatium striatum van Hasselt (Phylomicidae)	a terrestial snail	Cowie (2002a); Robinson (2006)
Parmarion cf. *martensi* (Simroth) [identification tentative]	a semi-slug [1]	Robinson (2006)
Paropeas achatinaceum (Pfeiffer)	a snail	Robinson (2006)
Pila ampullacea (Linné)	"apple snail"	Robinson (2006)
Pila conica (Wood)	"apple snail"	Robinson (2006)
Pomacea canaliculata (Lamarck) [2]	channelled apple snail	Cowie (1977; 2002b); Robinson (2006)
Veroncella cubensis (Pfeiffer) (Mollusca: Veronicellidae)	two striped slug or Cuban slug	Cowie (1977; 2002b); Robinson (2006)

[1] Carrier of human parasitic nematode, *Angiostrongylus cantonensis*
[2] This is the worst of four *Pomacea* species in HI

Conclusions

No exceptional risks found for Idaho proposal

Three notable mitigation factors

We found no exceptional risks related to the Idaho Waste Systems proposal that justified a finding different from that given in the earlier document by CPHST (2005a). Three risk mitigating factors seemed particularly noteworthy:

- The climate in Elmore County is very different from that of Oahu;
- Very few invasive plant species of concern in Idaho are present in Hawaii
- The risks from potentially invasive diseases and pathogens are likely to be mitigated by the bale technology, climate, and other factors

Overall conclusion is an insignificant risk of plant pest establishment

Overall, Idaho Waste Systems transporting MSW from Hawaii to Simco Road Regional Landfill in plastic-wrapped, airtight bales poses an insignificant risk of plant pest establishment.

This assessment only dealt with pest risks

The pathway may be disallowed for other reasons

Finally, we note that we have only addressed the plant pest risks associated with the proposal by Idaho Waste Systems to move baled MSW from Hawaii to Idaho. Complete approval of the proposal (pathway) or particular procedures should not be inferred. The pathway and proposal in question may still be subject to denial or modification, in whole or in part, based upon other issues or constraints (pest or non-pest related), such as available resources or other State or Federal regulations.

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Appendix A. Updating the models for the likelihood of bale-rupturing accidents during transport of baled municipal solid waste (MSW) by truck, rail, or barge.

I. Introduction

This appendix describes updates and changes to the previous model version

In 2006, we released a description of the models used to estimate the likelihoods of bale-rupturing accidents occurring during transport of baled MSW to landfills on the U.S. mainland by either truck, rail, or barge. Since then, more data on accident rates has become available, and we have changed the way barge accidents are predicted, so we discuss below the changes and updates to the accident models.

Only relevant sections included here

Only the relevant sections are included below. For full model details and descriptions, see Appendix B in CPHST (2006a).

Also report effects on previous model results

For completeness, though, we have also included the effects these changes would have on the results of previous models, for the generic situation (CPHST, 2006a) and for the Washington state PRA (CPHST, 2006b).

II. Updated accident-related distributions

A. Barges

1. Total accidents

Barge accident rates were in ton-miles before

The first change made was in the way we calculated the barge accident rate. That rate used to be based on ton-miles, because that is how waterborne freight is commonly reported (e.g., U.S. Army Corps of Engineers, 2003). In contrast, the accident rates for trucks and trains are based on vehicle miles traveled (VMT). That had the unfortunate effect, however, of increasing risk if the tonnage transported increased, even if total distance traveled was unchanged. Therefore, we changed the barge accident rate to match the others, calculating it in terms of miles rather than ton-miles.

Changed to a rate based on miles, not ton-miles

“Average haul” statistic provided necessary conversion factor

To do this, we needed to estimate annual miles traveled from annual ton-miles. We converted ton-miles to miles using the national “average haul”, or the mean number of miles a ton of freight travels by water. For internal (inland) barge traffic, this value has been relatively constant over the years at about 465 miles per ton (U.S. Army Corps of Engineers, 2006b). Using these values, and total annual ton-miles for the Columbia River system (U.S. Army Corps of Engineers, 2006a), we calculated mean annual miles traveled, which was about 110,000 miles.

Mean annual barge miles on the Columbia was 110,000 miles

The accident rate was calculated from statistics for 2000 to 2005 for

Fewer accidents in 2003 and 2005 than other years

Model rate was a triangular distribution

numbers of accidents on the Columbia River (U.S. Coast Guard, 2007). The previous estimate was based on just two years of data, 2000 and 2001. The number of accidents per year was often about 80 to 85, in years 2000, 2001, 2002, and 2004. But in 2003 it was only 29, and in 2005 it was 36. The accident rate was annual accidents divided by miles, and these values ranged from 0.00028 in 2003, up to 0.00088 in 2002. The mean value was 0.00061. We estimated the model rate as a triangular distribution (Fig. A1) with most likely value = mean value, and the minimum and maximum values from the 99 percent confidence limits around the mean. Ninety percent of the sampled values from the distribution were between 0.00032 and 0.00090.

2. Relevant accidents

Data unchanged

Accident reporting to the level of type of vessel has apparently stopped since the last work was done, and so it was not possible to include more information. Even in the previous PRA we only had data on this from 2000 and 2001.

3. Bale-rupturing accidents

Updated release rate

No change from previous estimate

We updated the estimate of the proportion of barges in serious hazardous waste accidents (1990-1997 data) with data from 1998 to 2006 (Hazardous Materials Information System, 2007a, 2007b). The updated data had 6 serious incidents out of 216 total incidents (2.8 percent). When combined with the previous data, the new beta distribution had a mean of 0.046, and 90 percent of sampled values were between 0.028 and 0.069 (Fig. A2). The updated mean value was about half of the previous mean.

Fig. A1. The distribution for the barge accident rate, number per miles traveled, based on data from 2000 to 2005. Lines are the 5th and 95th percentiles, so 90 percent of samples fall between the lines.

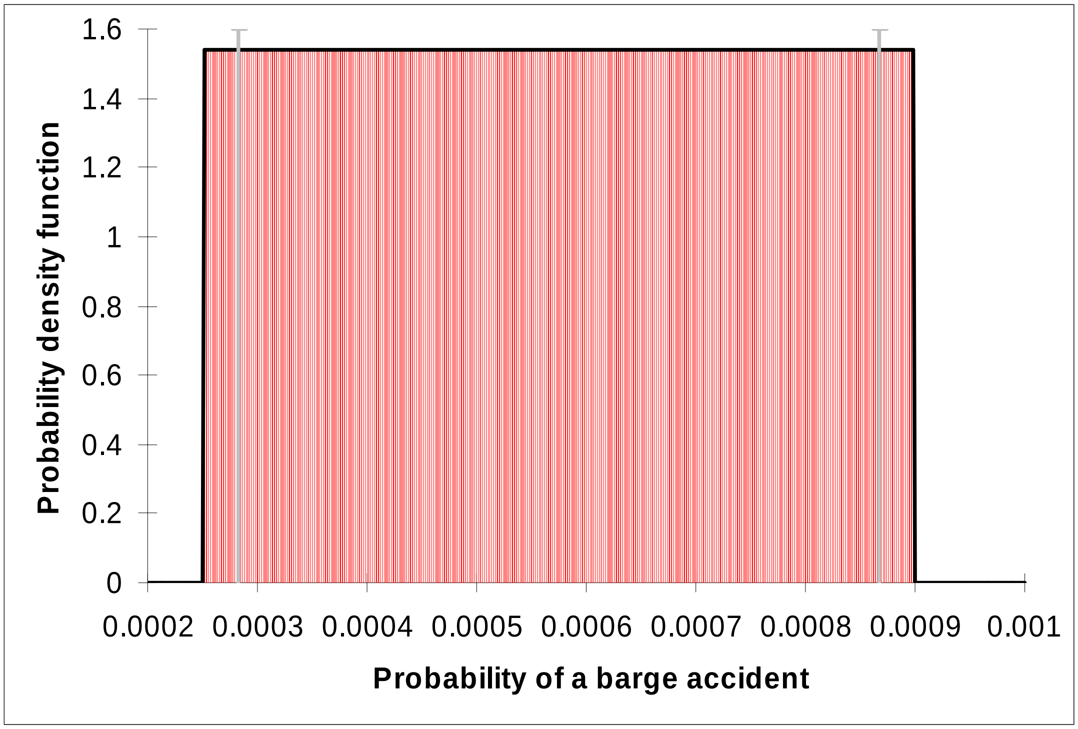
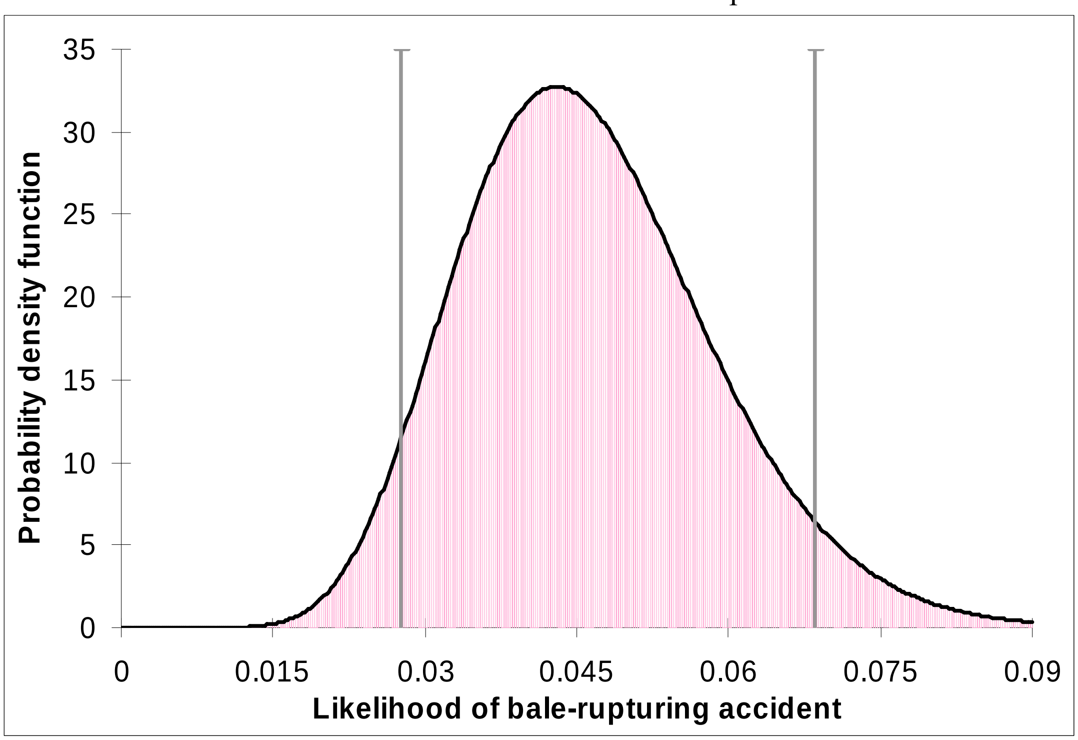


Fig. A2. The distribution for the likelihood of a barge accident causing bale rupture, based on data from 1990 to 2006. Lines are the 5th and 95th percentiles.



B. Trucks

1. Total accidents

Updated estimate with 2005 data

We updated the data to include 2005 accidents. The new mean rate was 1.89 accidents per million VMT, a decrease from the previous mean of 1.96. The pert distribution had minimum = 1.56, and maximum = 2.23, with 90 percent of sampled values between 1.68 and 2.10 (Fig. A3).

2. Relevant accidents

Overall probability is based on two likelihoods

The likelihood of an accident being relevant is the product of two likelihoods: 1) the probability of an accident during intrastate travel, and 2) the probability of an accident occurring to a flat bed truck.

Likelihood of an accident to an intrastate truck

Before, the distribution for the likelihood of an accident to an intrastate truck was based on data from 2003 to 2004 only. We updated that data here to include 2002 to 2005 data (Federal Motor Carrier Safety Administration, 2007). The likelihood was estimated as the proportion of accidents to intrastate trucks, which had a mean of 0.148, with 99 percent confidence limits of 0.124 to 0.172 (Fig. A4). Ninety percent of the sampled values were between 0.133 and 0.163.

Likelihood of an accident to a flat-bed truck

Before, the likelihood of an accident being for a flat bed truck was based only on 2004 data. Here we specified the distribution based on 2002 to 2005 data (Federal Motor Carrier Safety Administration, 2007). The mean proportion of accidents to flat bed trucks was 0.178, with 99 percent confidence limits of 0.152 to 0.204 (Fig. A5). In the model distribution 90 percent of the sampled values were between 0.162 and 0.194.

Figure A3. The distribution for the truck accident rate, number per million miles traveled, based on data from 2000 to 2005. Lines are the 5th and 95th percentiles.

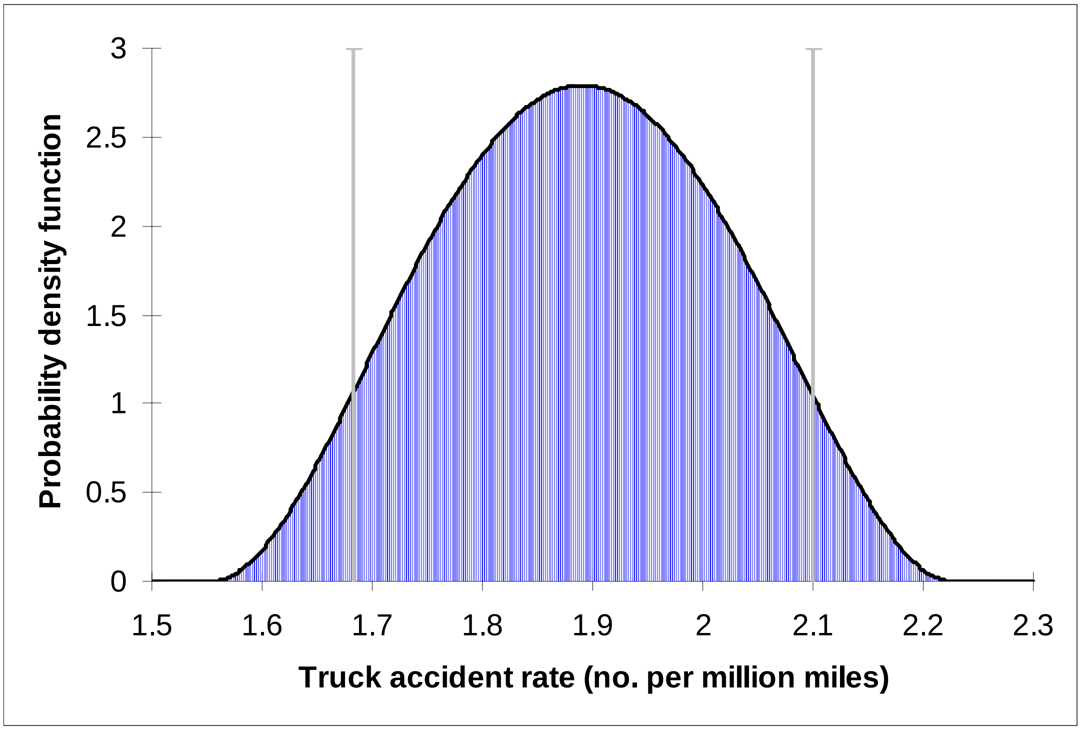


Figure A4. The distribution for the likelihood of an accident being for intrastate transport, based on data from 2002 to 2005. Lines are the 5th and 95th percentiles.

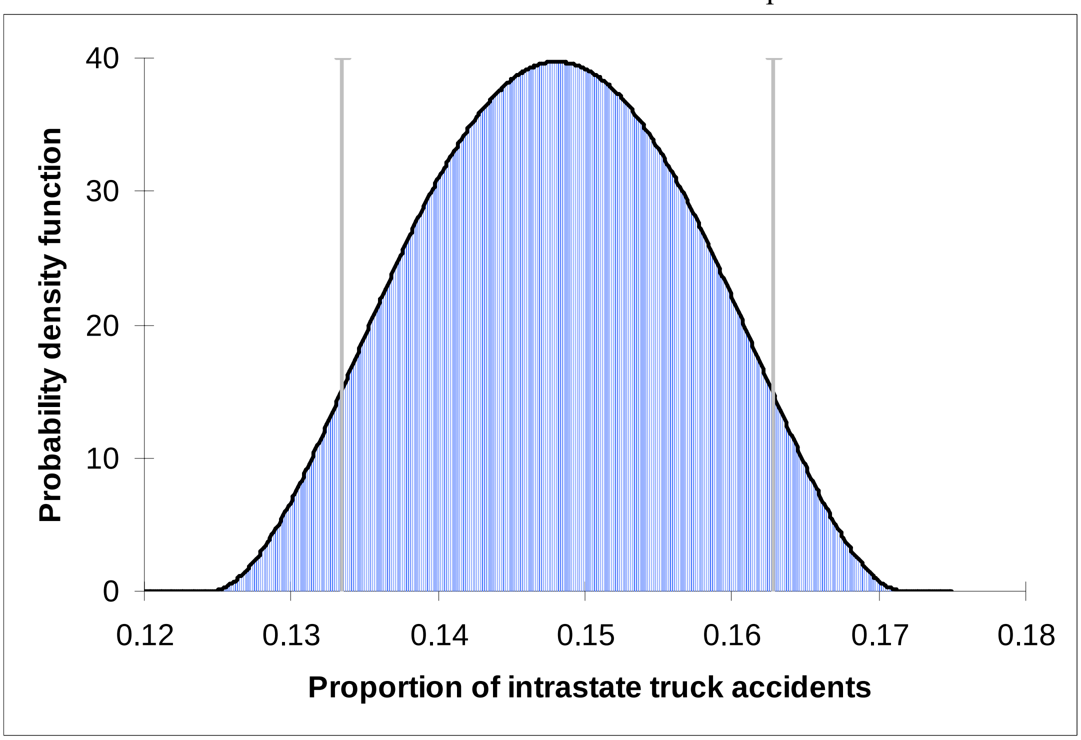
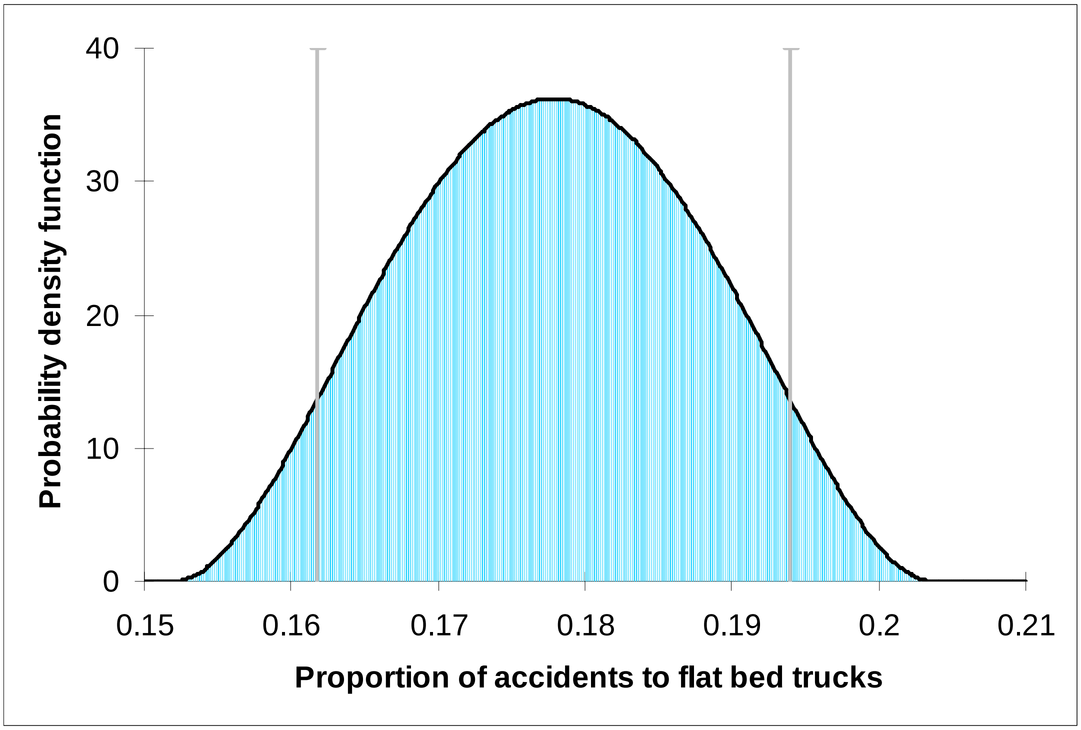


Figure A5. The distribution for the likelihood of an accident being for a flat-bed truck, based on data from 2002 to 2005. Lines are the 5th and 95th percentiles.



C. Trains

1. Total accidents

Updated accident rate by including 2005 data

For trains, we estimated the national accident rate from ten years of data, 1996 to 2005 (Office of Safety Analysis, 2006b). The overall mean was 3.92 accidents per million VMT, for all companies and all modes (e.g., yards and main lines). The distribution based on the 99 percent confidence limits of the mean was a pert with minimum = 3.645, and maximum = 4.186 (Fig. A6). Ninety percent of the sampled values were between 3.75 and 4.08. Compared to the previous estimate, the values and distribution changed only very slightly.

Very little change from previous estimate

2. Relevant accidents

Updated main line freight accident numbers

We updated the numbers of accidents to freight trains on main lines. The overall probability of an accident being relevant was the product of the two probabilities for freight and main line accidents.

Number of freight train accidents

Using data from 2000 to 2005, 9,893 out of 21,485 accidents were to freight trains (Office of Safety Analysis, 2001, 2003, 2004, 2005a, 2005b, 2006a). We summarized this with 99 percent confidence intervals for the annual proportion, which gave a pert distribution with mean = 0.462, minimum = 0.412, and maximum = 0.512 (Fig. A7).

Ninety percent of the sampled values were between 0.431 and 0.493.

Number of main line accidents

Out of the 9,893 freight accidents, 5,488 were main line accidents. This data gave a pert distribution with mean = 0.555, minimum = 0.522, and maximum = 0.588 (Fig. A8). Ninety percent of the sampled values were between 0.534 and 0.576.

Little change from previous estimates

Compared to the previous values (data only through 2004), the mean proportion of freight accidents declined only slightly, from 0.47 to 0.462, and the mean proportion of main line freight accidents was basically unchanged: 0.55 then and 0.555 now.

3. Bale-rupturing accidents

Updated release rate

We updated the estimate of the proportion of trains in accidents releasing hazardous materials with data from 2005 and 2006 (Office of Safety Analysis, 2006a, 2007). The new mean proportion of accidents releasing waste was 0.039. The pert minimum was 0.031 and the maximum was 0.048, with 90 percent of sampled values between 0.034 and 0.045 (Fig. A9). These values were almost unchanged from the previous parameters.

No change from previous estimate

Figure A6. The distribution for the train accident rate, number per million miles traveled, based on data from 1996 to 2005. Lines are the 5th and 95th percentiles.

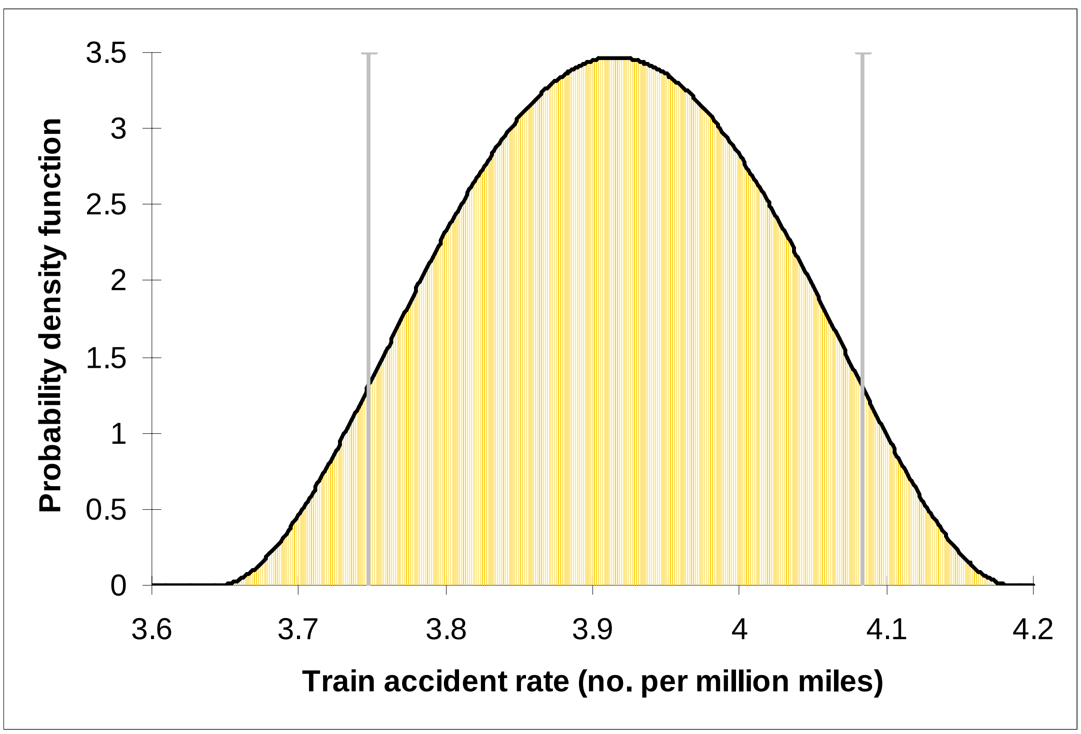


Figure A7. The distribution for the likelihood of a train accident being for a freight train, based on data from 2000 to 2005. Lines are the 5th and 95th percentiles.

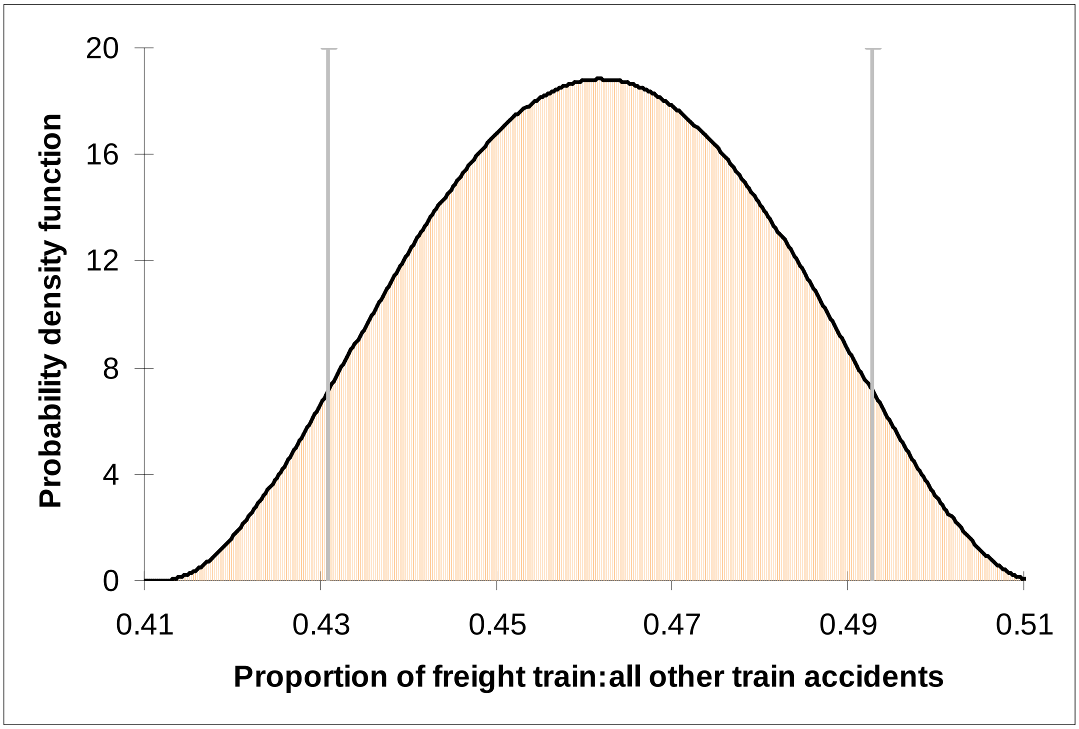


Figure A8. The distribution for the likelihood of a train accident being for a main line freight train, based on data from 2000 to 2005. Lines are the 5th and 95th percentiles.

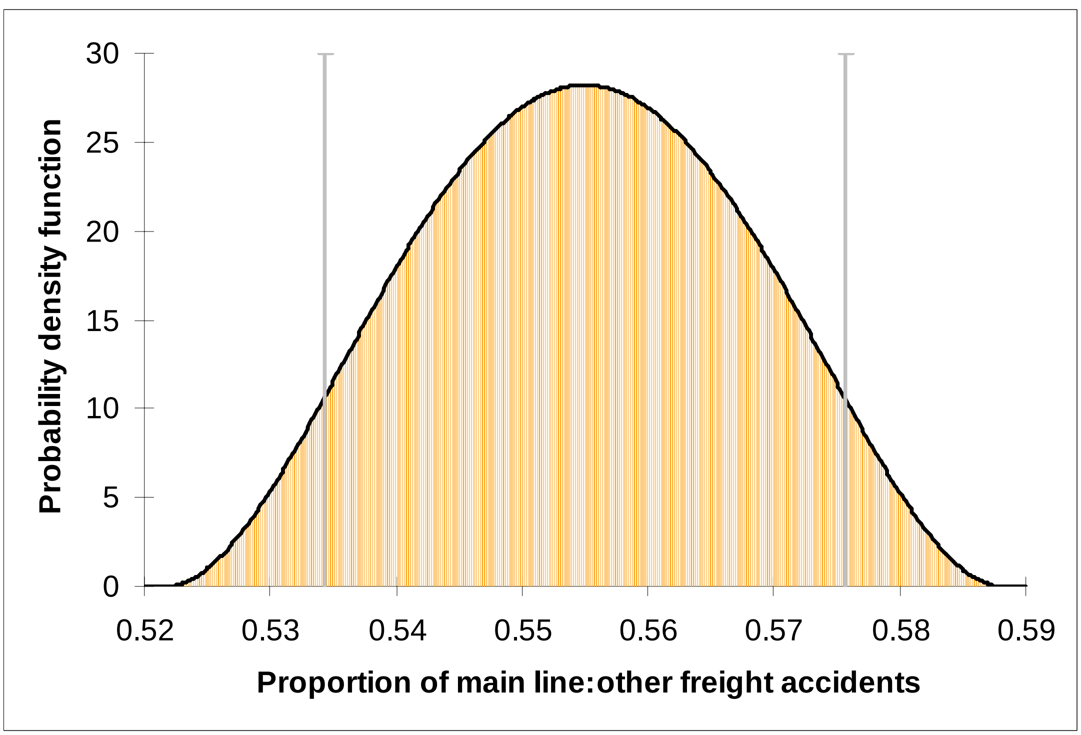
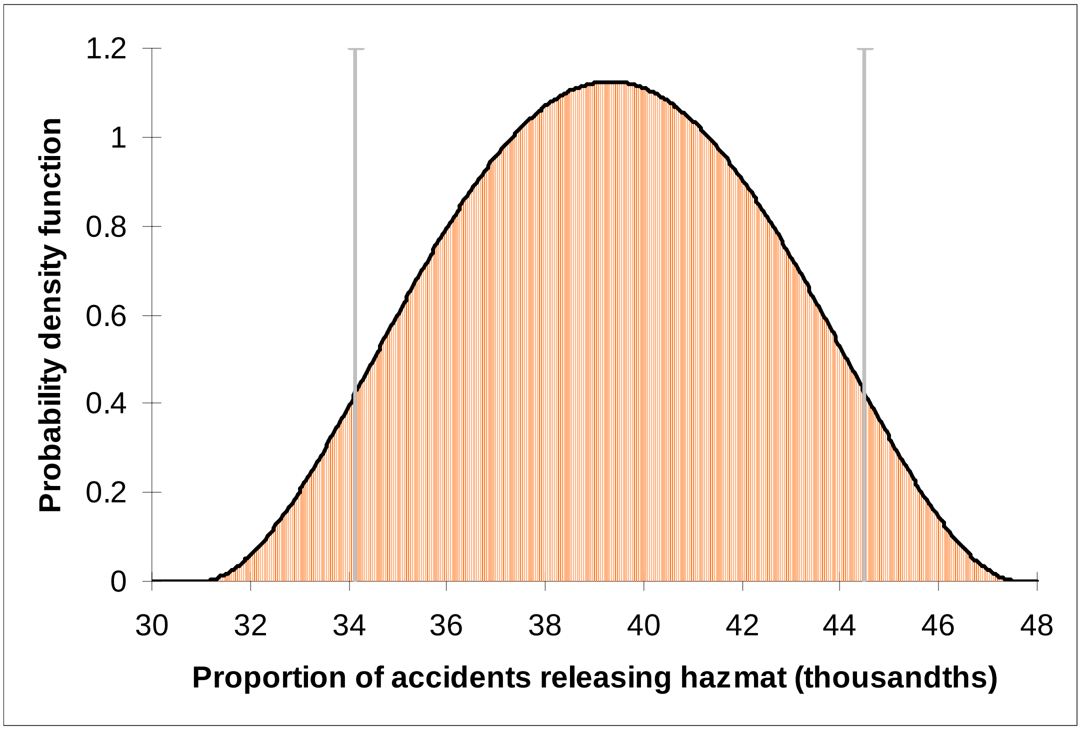


Figure A9. The distribution for the likelihood of a train accident releasing hazardous materials, based on data from 2005 and 2006. Lines are the 5th and 95th percentiles.



II. Updated results from previous models

A. Generic model

Updated estimates not greatly different

Barge transport was riskiest of the three conveyances

Estimates of risk declined for train transport and increased for transport by barge or truck (Table 1). Still, the differences were not particularly great. For example, the annual probability of a bale-rupturing accident for barge transport more than doubled, but the mean years to first occurrence was still 308 years. Likewise, the mean number of years to the first bale-rupturing accident for truck transport decreased to 161 years. The same response variable for train transport increased by about 400 years, to 1818 years. The riskiest conveyance in the generic situation, therefore, was still by barge, which had a 95 percent chance that the first bale-rupturing accident would not happen for at least 7 years.

B. Washington state model

Risk of truck transport increased four-fold

Risk estimates increased by a factor of four for truck transport in the Washington state model, with the mean annual probability of a bale-rupturing accident changing to 0.0011 from 0.0003 (Table 2). Despite this, the annual probability was still very low: mean years to the first

Only a 5 percent chance of happening within 49 years

occurrence was 952 years. In this case, there was only a 5 percent chance of that happening within 49 years.

Risk during barge transport also increased

The annual probability of a bale-rupturing accident during barge transport increased from 0.0037 to 0.0065 (+76 percent). Still, mean years to first occurrence was still 155, with a 5 percent chance of happening within 4 years.

Table 1. Comparison of results from the previous generic accident model with results from the updated model.

Response variable	Truck		Train		Barge	
	Updated	Previous	Updated	Previous	Updated	Previous
p(any bale-rupturing accident)	0.0062	0.0035	0.0006	0.0007	0.0033	0.0029
Years to 1st bale-rupturing accident	161	285	1818	1429	308	344
5th percentiles	9	15	94	74	16	18

Table 2. Comparison of results from the previous accident model for transport to Washington state with results from the updated model.

Response variable	Truck		Barge	
	Updated	Previous	Updated	Previous
p(any bale-rupturing accident)	0.0011	0.0003	0.0065	0.0037
Years to 1st bale-rupturing accident	952	3333	155	130
5th percentiles	49	171	8	7

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