Environmental Assessment
Beet Leafhopper Integrated Pest Management
WY010-EA-07-102

BLM Office: Worland Field Office
Proposed Action Title / Type: Beet Leafhopper Integrated Pest Management
Location: Various Townships and Sections of Big Horn, Hot Springs, and Washakie Counties, Wyoming

1.0 PURPOSE AND NEED FOR ACTION

1.1 Description of Proposed Action

The Worland, Wyoming BLM Office proposes to enter into a Cooperative Agreement with Big Horn, Hot Springs, and Washakie Counties to treat beet leafhoppers (BLH) with an Integrated Pest Management Program. To promote success in decreasing BLH populations, public land adjacent to agricultural land would receive routine prophylactic weed treatment and be treated with aerially applied insecticides during BLH outbreaks. An outbreak is defined as finding more than one beet leafhopper per ten sweeps in weedy areas, and more than 8 percent of the leafhoppers are viruliferous.

1.2 Purpose and Need for Action

Beet curly top virus (BCTV) is a viral disease of sugar beets, tomatoes, melons, peppers, beans, cucumbers, squash, pumpkins, spinach, vine seed, and other commercially important crops, including ornamentals. BCTV not only infects commercial crops, but also can infect backyard vegetable and flower gardens. Native North American non-agricultural plants, such as rabbitbrush (*Ericameria* spp.) that serve as BLH hosts can be infected with CTV and not exhibit symptoms of infection.

The only known vector of BCTV is *Circulifer tenellus* (Baker), commonly known as the beet leafhopper (BLH). BLH are non-native desert insects introduced from the Middle East, probably in the late 1800's. Years with below normal precipitation provide favorable environmental conditions for the growth and reproduction of BLH populations which, in turn, increases the potential for the spread of BCTV and its potentially devastating effects on the agricultural economy. Adult BLH fly into agricultural fields usually after the population has passed one or more generations on native non-agricultural plants and rangeland weed hosts such as mustards (*Brassica* spp.), Russian thistle (*Salsola* spp.), Kochia (*Kochia scoparia* (L.) (Schrader)), and lambsquarters (*Chenopodium* spp.). As hosts dry down and cure, leafhoppers are stimulated to migrate to new host plants. Summer hosts for BLH include Russian thistle and cultivated hosts such as sugar beets, beans, tomatoes, and peppers. As the summer hosts dry down, the populations move back to non-cultivated hosts to pass the winter. There can be up to three generations of BLH produced per year. Dependent upon the host plant species and climate, either adults or eggs can over winter. The BLH prefers habitats and environmental conditions that produce sparse open vegetation. In years with above normal winter and spring precipitation, BLH populations are generally limited because lush rangeland vegetation reduces optimum breeding acreage and concentrates BLH populations into smaller areas. In years with below normal precipitation, sparse rangeland vegetation increases optimum breeding acreage and the potential for developing a large BLH population. Extended drought reduces all rangeland vegetation densities and, subsequently, BLH habitat and densities. Precipitation of less than 10 inches per year on sparsely vegetated rangelands produces the optimal breeding habitat for BLH.

BLH acquire BCTV only by feeding on a plant that is already infected with CTV. A few minutes of feeding are enough to contaminate the insect with the virus for the rest of its life. The insect can only transmit the virus by feeding on host plants. As it sucks the juice from the plant it leaves behind virus

particles in the leaf veins. Adult BLH are generally better transmitters of the virus than the young nymphs. Many native and introduced weeds harbor the virus without developing CTV symptoms. CTV cannot be spread in soil, seed, or by human contact. It also does not survive in the soil.

Sugar beets have been grown in the Big Horn River Basin for more than 70 years. Many fields were planted to sugar beets every year for 20 years or more until disease pressure increased to the point that rotation with other crops became necessary. Even today many fields have relatively short rotations of one to two years between sugar beet crops. Under this intense sugar beet cropping system, effective management of BLH that vectors BCTV is essential if the current level of sugar beet production is to be maintained or increased. When weather conditions are optimum for BLH development, stand and yield losses can occur.

In the early part of the 20th century, large areas of the Big Horn River corridor were cleared of native vegetation to plant agricultural crops. Non-native weed taxa, probably from contaminated seed or agricultural equipment, established along irrigation ditch banks and in the floodplain. At the same time, unrestricted livestock grazing (on land that is both inside and outside of the river corridor) eroded the native vegetation that is now BLM rangeland. Compounding these historical events, drought for the past several years and wildfire has resulted in weakened, sparse, perennial native vegetation on the rangeland in proximity to the agricultural areas. The result has been a massive increase in areas ideal for BLH reproduction, where natural vegetation that can be infected with CTV is supplemented with non-native mustards, Russian thistle, and other annual weeds known to act as BLH host plants.

Survey and chemical control of BLH could take place at many locations in the Big Horn and Wind River Basins. While the potential for treatment is widespread, the majority of treatments done in the past two decades occurred in the Big Horn River corridor in Big Horn and Washakie Counties on private land. BLH was found extensively in surveys throughout the Big Horn Basin done in 1992 through 1994, occurring in 60.8 percent of sugar beet fields in Big Horn County and 72 percent of sugar beet fields in Washakie County (Gray and Gerik, 1998). Not all BLH breeding grounds require treatment every year. The size and location of annual control activities is dependent on the location, size, and distribution of the BLH population. BLH development is influenced by winter temperatures, rainfall, vegetative growth, prescription and wildfire, and soil disturbance. Treatment priorities on private lands in the Big Horn and Washakie Counties have been given to areas that are: 1) subject to perennial virus infection, 2) sustain significant infection from the previous year, and 3) harbor the highest current BLH populations.

Because BLH-vectored BCTV can be devastating to agricultural production and its life history includes stages in which it is present on public lands, reduction of its population size requires cooperative integrated pest management (IPM). Without the cooperative treatment of BLH, BCTV would continue to threaten susceptible crops and could threaten home gardens. Many of the sugar beet fields located at the Big Horn - Washakie County line are adjacent to, interspersed with, or in proximity to BLM lands. The lands are sparsely vegetated and/or harbor significant populations of weeds known to be used by BLH populations for ovi-positing and over-wintering.

Use of BCTV resistant seed, application of ground based insecticides, and herbicide application and/or prescription fire treatment to weed infested areas can moderate the impacts of yearly BLH populations and consequent BCTV infections. In heavy outbreak years, however, aerial insecticide application must also be used to significantly reduce BLH population sizes. When BLM lands harbor large populations of adults, it would be cost-effective and good management practice to treat those areas as well as private land that is scheduled to receive aerial insecticides.

1.2.1 Benefit to Public Land

IPM to treat BLH and decrease the incidence of CTV has benefit to public land. The treatments used in IPM would modify and enhance wildlife habitat, reduce the incidence of weeds, and reduce fuel loads that promote and maintain wildfire.

1.3 Decisions to be Made

The Authorized Officer must determine whether to treat the proposed BLH IPM area. The Authorized Officer could decide to not treat if treatment would cause unnecessary or undue degradation to the public lands, or if it would threaten another Federal law.

The Authorized Officer must determine whether the proposed action could result in significant impact to the human environment. If not, this determination would be documented in a Finding of No Significant Impact (FONSI). If the impacts could be significant, an environmental impact statement would be necessary.

1.4 Related NEPA and Other Documents

This Environmental Assessment is tiered to:

Bighorn River Habitat & Recreation Management Plan, 1987

BLM-WY-ES-022-4320, Final Environmental Impact Statement, Vegetative Treatment on BLM Lands in Thirteen Western States, 1991

Final EIS and Proposed Resource Management Plan for the Washakie Resource Area, 1988

Final EIS and Proposed Management Plan for the Grass Creek Planning Area, 1996

USDA, NRCS Invasive and Noxious Weeds, Wyoming State-listed Noxious Weeds, 2003

WY010-EA04-34, Worland and Cody Field Office BLM-Management Plan for Invasive Weeds in the Bighorn Basin of Wyoming, 2004

1.5 Conformance with land use plan

This proposed action conforms to the Record of Decision and Approved Resource Management Plan for the Washakie Resource Area dated 2 September 1988 and the Record of Decision and Approved Resource Management Plan for the Grass Creek Planning Area, 1996. These plans were reviewed to determine if the proposed action conforms to the land use plan as required by 43 CFR 1610.5.

1.6 Scoping and Issues Identification

Public announcement of the proposed action will be made in local newspapers in Wyoming and Montana and the proposed treatment description will be accessible on the Worland Bureau of Land Management NEPA web site at the following address:

http://www.blm.gov/wy/st/en/info/NEPA/wfodocs/leafhopper_ipm.html

1.7 Project Area Description

The Beet Leafhopper Integrated Pest Management proposed project area includes BLM lands with the northern most coordinates of 108° 3’ 514” N, 44° 29’ 56” W and the southern most coordinates of 108° 11’ 41” N, 43° 44’ 52” W (see map).

2.0 Proposed Action and Alternatives

2.1 Alternative Development Process

In developing the range of alternatives, a team consisting of the Bureau of Land Management’s rangeland management and fuels specialists, hydrologist, interim weed coordinators, and wildlife and fisheries biologists assessed the proposed project area to determine percent native versus non-native plants, overall plant community composition, and wildlife presence, use, and seasonal needs. Alternatives to chemical treatment were discussed and debated.

2.2 Alternatives Considered but not Analyzed in Detail

2.2.1 The use of an alternative aerially applied insecticide pesticide in conjunction with the “Proposed Action”.

Reasons for Rejection

Malathion is considered one of the safest pesticides. It is used extensively and safely as demonstrated by extracts from the Initial Scientific and Minieconomic Review of Malathion (E.P.A., 1975).

2.2.2 The eradication of all BLH hosts plant species on private and BLM rangeland areas.

Reasons for Rejection

The BLH utilizes many species of host plants for food and/or ova-position sites. The elimination of all host plant species would include native and introduced species, and would have a major impact on the ecosystem and wildlife dependent on the many BLH host plants.

Distribution, diversity, and populations sizes of BLH host plant species would make the eradication of BLH hosts practically impossible and extremely costly.

2.2.3 Biological Control of the Beet Leafhopper

Reasons for Rejection

At present there is no biological control agent for BLH that can be released on BLM land.

2.3 Description of Proposed Action and Alternatives

2.3.1 Alternative 1– IPM Program

The "Proposed Action" alternative of the BCTV IPM program represents a strategy for the control of the BLH populations in Big Horn, Hot Springs, and Washakie Counties where the BCTV infection of susceptible crops and backyard gardens is likely. BLH development is influenced by annual variations in temperatures, the timing and amount of precipitation, prescribed and wildland fires, and grazing. In the past decade control has been

performed only on private land that includes historical rangeland breeding grounds and along ditches and roadsides. As with most pest insects, control should be linked to the BLH life cycle and directed at disrupting its continuity. During outbreak years aerial treatments (fixed-wing) have been employed to control BLH populations on private rangeland habitat and in large cultivated fallow fields, while ground-rigs have been utilized to spot treat BLH populations within intensive agriculture and on adjacent private rangeland breeding grounds. While it is possible for BLH populations to develop anywhere within Big Horn, Hot Springs, and Washakie Counties, public land that can harbor BLH ovi-positing and over-wintering sites adjacent to and interspersed with agricultural lands have not been treated when populations have significantly increased on agricultural lands. To promote success in decreasing BLH populations, public land adjacent to and interspersed with agricultural land would receive prophylactic routine weed treatment and be treated with aerially applied insecticides during outbreaks. An outbreak is defined as finding more than one beet leafhopper per ten sweeps in adjacent weedy areas, and more than 8 percent of the leafhoppers are viruliferous (University of Wyoming Cooperative Extension Service, 1993).

This Environmental Assessment is only for the area presented in Map 1. If other areas are proposed to be included in the BLH IPM, they would be assessed on a case by case basis.

PROGRAM SPECIFICS

BLH Prophylaxis

Use of BCTV resistant seed

All sugar beet seed planted in beet fields adjacent to and interspersed with BLM lands would be required to be certified BCTV resistant. Photo-copy documentation of seed certification would be made and retained by the Washakie County Weed and Pest District. Copies of seed certification would be given to the Worland, Wyoming BLM Office Weed Coordinator before consideration of insecticide application would be made.

Weed herbicide treatments

Non-native weeds known to serve as hosts to BLH on private and BLM land adjacent to agricultural fields would receive herbicide treatments where and when appropriate by either ground-based or aerial application. Application of herbicides on private land would be carried out by or under the direction of the Big Horn, Hot Springs, and/or Washakie County Weed and Pest District(s). Application of herbicides on BLM lands would be done in accordance with the Vegetative Treatment on BLM Lands in Thirteen Western States Final EIS. Herbicide treatments on BLM land would be by Big Horn, Hot Springs, and/or Washakie County Weed and Pest Districts, BLM employees that are DOI certified pesticide applicators, or contracted Wyoming State Certified herbicide applicators that are under the direct supervision of a DOI certified pesticide applicator. The BLM herbicide treatments would be only with BLM approved formulations and a current certified pesticide use proposal (PUP) on file. Only approved aquatic formulations would be applied to a watercourse area or wetland. If a non-aquatic formulation would be used near a watercourse or wetland, it would be applied with the appropriate distance buffer as outlined in the Vegetative Treatment on BLM Land in Thirteen Western States Final EIS. Herbicides used on BLM land would be rotated annually or semi-annually to avoid the development of specific herbicide resistant populations.

The correct dose of herbicide specific for each invasive weed taxon would be applied at the correct time. Chemicals that would be used as herbicide treatment are listed in Table 1. First choice chemicals used to treat the invasive weed taxa would be BLM approved and listed for aquatic application. Second choice chemicals used to treat the invasive weed taxa would be BLM approved and be applied with a 200-foot buffer strip from water courses and designated wetlands. Areas within the proposed treatment area that have permitted grazing of livestock would be treated with herbicides that have no grazing restrictions. Because annual applications of

herbicide may be necessary for decades to control and/or contain the infestations, first and second choice chemicals would be rotated to avoid herbicide resistance. Herbicide treatments would be recorded with documentation of applications maintained for 10 years by the Worland Field Office Weed Coordinator.

Table 1 Herbicides for use on proposed BLH IPM area

Herbicide	Brand Name Examples	Target weed species	Grazing Restriction
2,4 D	Aqua-Kleen® * Opti-amine®	Broadleaf	None 30 days
Clopyralid	Curtail® Reclaim®	Annual and perennial broadleaf	None None
Metsulfuron methyl	Escort®	Perennial and biennial	None
Glyphosate	GlyphoMate® * Rodeo® * RoundUp®	Annual and perennial	None None 14 days
Imazapyr	Arsenal® Habitat® *	Perennial grasses, broadleaf, vines, brambles, brush, woody stumps	None None
Picloram	TordonK® Tordon 22K®	Perennial broadleaf, vines, woody	14 days 14 days
Triclopyr	Garlon® Remedy® *	Woody and annual broadleaf	None (if 2 quarts per acre or less applied) Following growing season

* Approved for aquatic use

Weed prescription burn treatments

Prescription burn treatments would be used to decrease emerging and/or standing non-native BLH hosts on BLM lands. Burn treatments would be done in accordance with the USDI BLM Prescribed Fire Management Handbook (October 2003) and carried out by BLM fire personnel. A burn plan would be created and approved prior to treatment.

BLH Monitoring

Determining the status of BLH populations is dependent on survey with insect nets. Both pre- and post-insecticide treatment surveys would be conducted on foot on both private and BLM land using the equipment, technique, and protocols outlined in Appendix 1, Sugar Beet Curly Top Virus and the Beet Leaf Hopper (University of Wyoming Cooperative Extension Service, 1993) by the Washakie County Weed and Pest District. The goal of monitoring BLH on BLM land is to find areas where a large spring population has developed and to prevent migration to private land crops during late spring and early summer. Those areas found to harbor an outbreak, more than one beet leafhopper per ten sweeps in weedy areas, and more than 8 percent of the leafhoppers are viruliferous, would be selectively treated at the same time that private land is treated. Sampling would be done only when air temperatures are 60° F or greater to insure adequate leafhopper activity.

Insecticide Treatment

Insecticide control of BLH that meet outbreak definition would be accomplished by application with fixed-wing aircraft. Malathion would be applied across delimited areas at one gallon of mix per acre. A swath width of 100-125 ft would be utilized with fixed-wing aircraft application.

Malathion ULV 95% (34704-565) would be applied. Malathion ULV would be mixed at a rate of 7.7 oz. in 120.3 oz. of buffered water. The mix would be sprayed at a rate of one gallon/acre, or 0.583 to 0.592 lbs of active ingredient per acre, to control BLH populations.

Concentrated malathion and water would be transported to the aircraft loading site as near to the control area as practical. Mixing would be accomplished by metering water, buffered to a pH of 6.5, into a mix tank then metering the prescribed ratio of malathion into the mix tank under agitation. The aircraft would be loaded by connecting a hose with a drip proof connector between the mix tank and the aircraft. Each load transferred to the aircraft would be metered and checked against the known area treated to assure proper application rate. Spray booms would be calibrated on site before application started and periodically re-checked during the course of the operation. Nozzle arrangement and boom lengths would be adapted to allow for the differences in operating speeds of various aircraft while delivering a gallon/acre with an average droplet size of 350 microns.

To aid the accuracy and efficiency of the aerial application, Global Positioning System (GPS) navigational equipment would be required under contract to aid the precise application of malathion. Prior to treatments, County Weed and Pest District staff would obtain GPS points around mapped potential treatment sites with a hand held GPS unit. This information would be placed on a potential treatment map and given to the pilot for reference. The GPS points would allow the pilot to locate the general vicinity of the treatment polygon.

The aircraft and pilots would have to meet or exceed all FAA standards. In addition, it would be required that the pilot be an agricultural pilot and have a minimum of 1,000 hours in the type and model aircraft being used

PUBLIC HEALTH and ENVIRONMENTAL CONSIDERATIONS

Public Health and Safety Considerations

Malathion has been used for 50 years on commercial food crops, home gardens, landscaping, pets, and livestock and mosquito abatement and fruit fly eradication projects. The relatively small quantity of 0.583 to 0.592 lbs. of active ingredient per acre malathion, as specified in the “Proposed Action”, limits potential exposure for people living in or near the treatment areas.

As a requirement of the Food Quality Protection Act of 1996, the U. S. Environmental Protection Agency (EPA) periodically evaluates the use of malathion and other organophosphates for human health and ecological risks. In response to the most recent EPA evaluation (EPA, 2000), EPA’s Health Effects Division’s Cancer Assessment Review Committee proposed to classify malathion data as “suggestive evidence of carcinogenicity but not sufficient to assess human carcinogenic potential”. Two expert panel reviews were unable to agree with this conclusion and recommended additional study. To date, malathion has not been classified by the EPA as a carcinogen nor is there convincing evidence that malathion is a carcinogen, teratogen, or reproductive toxin or that it damages nerves. Due to the low application rates the Proposed Action is not expected to pose a carcinogenic risk to the general public or IPM employees/contractors. There is a possibility for individuals who have a hypersensitive or allergic reaction to malathion or adjuvants utilized in the spray mix to be affected by the Proposed Action.

Prior to treating an area by air, the pilot would be informed of local non-target sites including water sources, sensitive species sites, livestock, and any people working or passing through the treatment area. Where vehicles are able to travel, IPM personnel would patrol ahead of the aircraft to alert anyone who may not have been notified. When feasible, entry points into the treatment area would be restricted by stationing a person to notify people of the pesticide application in progress. Wind direction and velocity would be monitored to prevent pesticide drift out of the target area. Pilots would be instructed to turn off spray when people or vehicles are encountered in the treatment area.

Notification

The notification of property owners prior to survey and BLH control would be a fundamental part of the IPM program. Written permission for continued survey and possible treatment would be solicited from the owners or lessees of public and private lands where BLH host plants have been mapped. County property plat books would be used to locate names and addresses of property owners. Comments or special instructions would be requested from the landowners in an effort to minimize the impact of the Program on their daily activities. Special concerns of property owners may include honeybees, livestock, water sources, work crews, recreational uses, or pre-existing medical conditions of landowners. Copies of both the malathion label and material safety data sheet would be made available on request (See Appendix 2, Malathion label and MSDS).

A special effort would be made to give a 24/48-hour notice of treatment to property owners. The one to two-day notice would be more commonly requested by the various oil companies to inform company personnel and private contractors within the oil fields where BLH control will be performed

The BLM would request a substantial prior notice of treatment and coordination meetings. These would serve to highlight safety concerns, notify field supervisors, staff, and crews and allow for pre-assessment of the potential treatment sites and sensitive species locations.

Environmental Considerations

Honeybees

Due to the susceptibility of honeybees to malathion, care would be taken to locate apiaries during pre-treatment survey activities. Apiary locations would be mapped and the data stored in a GIS database. The County Weed and Pest Districts would notify beekeepers at least 48 hours prior to BLH control activities if BLH control must be performed within one mile of the apiary.

Avoidance Areas and Non-target Sites

Program personnel, through field assessments, would become acquainted with all physical characteristics of the terrain within the insecticide treatment area. This includes familiarity with non-target sites and situations such as human activity, livestock, water sources, sensitive species locations, and riparian zones.

The close familiarity with treatment areas would enable Program personnel to predict where non-target sites and situations would likely to occur. Maps provided by private parties, the BLM, National Resource Conservation Service, and the U.S. Geological Survey would be used to record the locations of BLH populations and the position of non-target sites. In addition, computerized field maps would aid field personnel and aerial applicators in identifying non-target areas within or adjacent to delimited treatment areas.

Prior to the treatment of each area, the aerial applicator would be briefed and given a map of non-target sites, treatment restrictions, and potential aviation hazards within areas to be treated. On occasion, reconnaissance flights would be performed to point out non-target areas and potential aviation hazards to pilots unfamiliar with a particular treatment area.

Water- Site-specific protection measures would include (1) the prohibiting of direct application to bodies of water; (2) the establishment of no-spray buffer zones (200 feet) for general bodies of water and irrigation water with no-spray buffer zones enlarged for specific sensitive species habitat; (3) reducing drift by not applying malathion when average wind speed exceeds 5 mph; and (4) application restrictions when rain is forecast.

Riparian Habitat- Riparian habitat is not conducive to the growth and development of BLH host plants and therefore would not be treated. The area of riparian influence or "green belt" is in stark contrast to drying rangeland vegetation where treatments would be conducted. Buffer areas of at least 200 meters would be left untreated near riparian watercourses. The buffers would extend from the outer edge of the influence of the watercourse (green belt) into arid areas of drying rangeland vegetation. Buffer zones would be widened sufficiently to compensate for the curvature of streambeds and current wind direction.

Numerous raptor nesting and foraging area are located along the Bighorn River corridor. Most raptors are actively raising dependant young through July 31. These nesting and foraging areas will be off limits to treatments through July 31 (see Map 2).

BLH breeding habitat, in close proximity to riparian water courses, would most often be located on the north side where the slope direction and host plant growth is suitable for BLH development. The slope and sun angle in rangeland habitat on the immediate south side of water courses is not conducive to BLH development and, when left untreated, would function as a buffer of 400 to 600 yards or more.

Runoff and Drift Prevention

Weather conditions within potential treatment areas would be important factors in determining the effectiveness of control applications. It makes little sense to apply expensive materials by expensive methods when windy or inclement weather conditions could nullify control efforts and increase the potential for drift or runoff into non-target areas.

Listed below are guidelines that would be employed to reduce the potential for drift and runoff from the influences of weather.

1. Prior to and during treatment activities, the local weather forecasts would be consulted on a daily basis to ascertain the likelihood of rain and wind. During control operations, wind speed and direction would be constantly monitored in the target area to eliminate drift into non-target areas. Aerial applications would be curtailed when average wind speeds exceed 5 mph. Constant communication would be maintained with aircraft to alert the pilot should weather conditions change. When necessary, buffer zones would be enlarged to compensate for wind direction.

2. When plant cover is moist due to recent rain or dew, malathion application would be delayed until the plant cover is nearly dry.

3. When there is a high probability (80%) of local moderate rain, 0.25 inch or less within 24- hours, the treatment area would be closely monitored to allow applied materials sufficient time to dry (at least four hours) before anticipated rainfall. Light showers of 0.10 inches or less appear to have little effect on the applied insecticide once dried on the plant surface.

4. If rainfall of more than a moderate amount (.25 inch or more) is predicted locally within 48 hours, proposed applications would be delayed until predictable local conditions improved.

Key Features of the "Proposed Action"

1. BLH population levels would be assessed within historical breeding sites on private and BLM land prior to undertaking aerial insecticide application control measures.

2.Control of the BLH would be accomplished through the application of malathion by aircraft where and when the Washakie County Weed and Pest District determines that BLH populations pose a threat to susceptible sugar beet fields.

3. Fixed-winged aircraft would be used to apply BLH treatments to private and BLM rangeland. Vehicles and all terrain vehicles would be utilized on existing roads to perform pre and post-treatment surveys and monitor aerial application.

4. Landing strips and related mixing equipment for fixed-winged aircraft would be located at a distance, further reducing noise and traffic in the immediate treatment area.

5. Aircraft would be calibrated and monitored during treatment to assure a rate of 7.7 oz. of 95% malathion per acre.

Exact formulation: 7.7 oz. + 120.22 oz. water + .08 oz. adjuvant = 128oz. mixture per acre (water is buffered as needed)

6. After treatment is completed, post-spray kill checks would be taken in all areas at 24, 48, and 72-hour intervals. Sampling would be the same as pre-treatment sampling. Post-spray checks would give a means of measuring effectiveness of the control work. The areas that were not sprayed would also be sampled, both to check for possible build-up of the BLH population and as a control to measure against areas sprayed.

7. All vehicles would be restricted to existing roads to prevent soil compaction and damage to flora and fauna. BLM vehicle designations would be adhered to where applicable.

8. Pre and post-treatment BLH surveys would be performed on foot.

9. All malathion applications would be monitored on the ground to ensure proper placement of insecticide and to monitor environmental conditions in the treatment area.

10. Wind speed and direction would be continually monitored to ensure that the insecticide does not drift into non-target areas.

11. To minimize drift, no application of malathion would take place when sustained wind velocities exceed 5 mph.

12. Great care and effort would be taken to ensure that natural or man-made bodies of water, sufficient to support any kind of wildlife, were not contaminated by runoff, drift, or by direct application. These areas include springs, wildlife guzzlers, stock ponds, reservoirs, streams, and riparian zones

a. Permanent and ephemeral water sources would be located prior to treatments during delimitation survey.

b. Adjacent to all bodies of water, a 200-foot buffer zone would be left untreated to ensure water quality and reduce impacts to sensitive wildlife.

c. Weather forecasts would be consulted prior to and during treatment operations to reduce the potential for runoff.

13. Beekeepers would be notified within a minimum of 48-hours of pending pesticide application.

14. Personnel would be trained to be observant of and avoid wildlife while using established roads within the areas of operation. The speeds of vehicles would be commensurate with the quality and condition of roads.

15. Managers of camps and recreation areas would be notified prior to treatment.

16. All Program personnel would be trained to minimize contamination in the event of an insecticide spill.

17. Aerial malathion application contractors would be required to furnish journey level pilots who have a minimum of 1,000 hours experience flying the type of aircraft used in pesticide application. The pilot would be required to possess all licenses required by the county and state.

18. To minimize contamination in the unlikely event of an aircraft accident, fixed-winged aircraft would carry a maximum of 50 gallons active ingredient (a.i.).

Measures to Avoid Potentially Major Effects to Species of Special Concern

General Measures

1. Motorized Vehicle Use

A. All vehicles would be restricted to established roads to prevent damage to flora and fauna and to prevent soil compaction. Personnel would be required to be observant of and avoid wildlife while driving in the area of operation.

B. Vehicle speeds would be commensurate with the quality and condition of established roads.

C. All vehicle restrictions established for travel on BLM administered lands would be adhered to when applicable. Special designated vehicle restrictions in lands administered by State Agencies would be observed.

2. Measures to Reduce Drift and Impacts to Wet Lands

A. To minimize drift, wind speed and direction would be continually monitored to ensure that aerial applications will remain in the target area. Aerial applications would not be performed when sustained wind velocities exceed 5 mph.

B. To reduce the potential impacts to sensitive aquatic non-target species from pesticide drift and contaminated runoff, a 200-foot buffer zone would be established around wetland areas.

2.3.2 Alternative 2 Reduced Project Alternative

Under the Reduced Project alternative, BLM lands would receive BLH survey, weed herbicide, and prescription burn treatments but would not allow the County Weed and Pest Districts to aerially apply malathion to BLM lands.

2.3.3 Alternative 3 No Action

Under the No Action alternative, there would be no BLH survey, aerial applications of malathion, herbicide treatment, or prescribed fire treatments on BLM lands.

3.0 Affected Environment

The following describes the existing environment in areas where BLH IPM activities would take place. Resources and features not present, and not discussed in this EA, include: Class I air sheds, prime or unique farmlands, hazardous or solid waste, Class I visual management areas, wild and scenic rivers, and wilderness. There are no known important land uses, or proposals for use, that occur in the area, such as mineral extraction, that would be affected by, or have the potential for cumulative impact with, the BLH IPM program.

3.1 Location and Land Ownership

The proposed areas are BLM managed lands as outlined on Map 1.

3.2 Climate and Air Quality

Climate data collected from towns within the area of the proposed herbicide treatments are presented in Table 1.

Table 1 Climate data for towns within proposed Beet Leafhopper Integrated Pest Management Area

Town	Mean Annual High Temperature (°F)	Mean Annual Low Temperature (°F)	Mean Annual Precipitation Rain (Inches)	Mean Annual Precipitation Snow (Inches)
Greybull	60.9	31.1	6.90	20.1
Basin	61.2	30.5	6.48	20.0
Worland	59.7	29.5	7.71	16.2
Thermopolis	63.4	32	11.35	30.0

Areas of the country where air pollution levels persistently exceed the national ambient air quality standards may be designated nonattainment. According to the Wyoming Department of Environmental Quality, there are no nonattainment areas in the Bighorn Basin.

3.3 Hydrology

Hydrology of the proposed BLH IPM area is greatly affected by management of Boysen Dam 20 miles south of Thermopolis. Flow records on the Wind/Bighorn River have been collected by US Geological Survey stream gage stations at the upstream end of the Big Horn Basin (below Boysen Dam and at Thermopolis) and at the downstream end of the basin (near Kane). Records below Boysen Reservoir have been collected after the dam was constructed in 1952 while the Thermopolis gage collected records prior to that time. For the purposes of this analysis, it is assumed that records from the two gages can be compared since no major tributaries enter the river between them. The following table includes average values for flow, peak flow, the date of peak flow for the

period before and after the dam was constructed, and the percent change between the pre dam and post dam periods.

Table 2 Flow data for the Wind and Bighorn Rivers

Existing (after 1952)	Flow (cfs)	Peak Flow (cfs)	Date of Peak
Below Boysen Reservoir	1,372	4,404	July 6
Kane	2,060	9,922	June 9
Historical (prior to 1952)			
Thermopolis	1,857	13,085	June 18
Kane	2,398	16,545	June 19
% Change (pre dam to post dam)			
Boysen/Thermopolis	-26%	-66%	18 days later
Kane	-14%	-40%	10 days earlier

Peak and base flows of the Bighorn River have changed due to management of Boysen Dam. Flow records from pre dam (1951 and earlier) and post dam (1952-2006) periods indicate that peak flows below Boysen Dam have decreased by approximately 64% (13085 cfs to 4404 cfs). Pre dam (1930-1951) and post dam (1952-2006) flow records at Kane show a 40% decrease in average annual peak flows from 16545 cfs to 9922 cfs and an average peak flow 10 days earlier in the year. Base flows during the late fall, winter, and early spring are increased over the pre dam conditions. The following graph shows average daily flow values for the Bighorn River at Kane for the pre dam period (1928-1951) and post dam period (1952-2006).

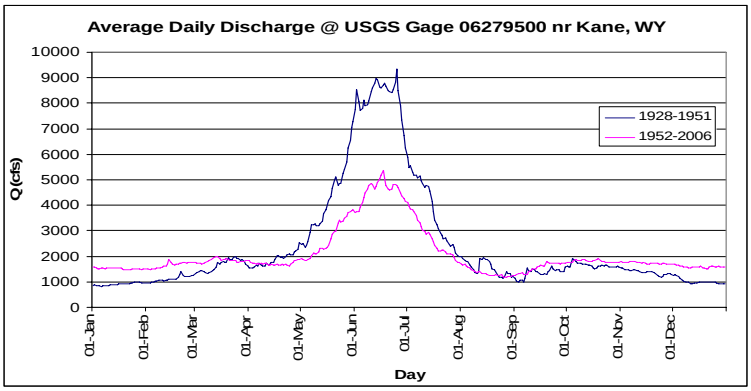

Figure 1. Average daily discharge at Kane, Wyoming

3.4 Wetlands

The proposed BLH IPM area is located adjacent to the floodplain of the Bighorn River. Some of the area may include wetland resources. The National Wetland Inventory (NWI) includes information on the aerial extent and basic categories of wetlands along the Bighorn River. Within the proposed BLH IPM area there are approximately 229 acres of wetlands in four separate classifications.

Table 3. Wetland types found in the proposed BLH IPM area

Wetland Type	Total Acres	# Units
Riverine	129	3
Freshwater Forested/Shrub Wetland	41	13
Freshwater Emergent	40	34
Fresh Water Pond	19	15

BLM field assessments of the BLH IPM area report that Russian olive and tamarisk are common at most sites and dominant at many. Native cottonwood trees were found in older stands and no regeneration of cottonwoods was noted at any of the field assessment sites. Common herbaceous vegetation noted in the assessments included reed canary grass, horsetail, and several species of Carex and juncus. In general, the wetlands include numerous facultative wetland species in addition to upland species, indicating relatively dry sites with infrequent inundation.

3.5 Water Quality

As the Bighorn River flows downstream through the Big Horn Basin, water quality generally deteriorates as the river accumulates higher concentrations of bacteria, sediment, and nutrients. Water quality data collected by the USGS at the gages below Boysen Reservoir and at Kane show a contrast in water quality between the two sites. Water below Boysen Dam is generally largely free of fecal coliform bacteria and sediment, with average values over the past few decades of less than five colonies per 100 mL (cfu) and 14 mg/L, respectively. At Kane the average values over the same general period were >500 cfu for fecal coliform, and 1583 mg/L for suspended sediment.

The Bighorn River has two segments included on the State of Wyoming's 2006 303(d) list of impaired or threatened waters. Table A of the list is titled "Waters with Water Quality Impairments" and includes the Bighorn River from Greybull River "downstream an undetermined distance above Big Horn Lake". This segment is listed with fecal coliform as the pollutant of concern. Table C of the 303(d) list includes "Waters with Water Quality Threats". The Bighorn River from its "confluence with Nowood River upstream an undetermined distance above the City of Worland" was placed on this list in 2002 and is listed with fecal coliform as the cause of the water quality threat.

3.6 Soils

The soils in the treatment area reflect the Riverine environment under which they formed. As such, soil characteristics are highly variable. The soils are generally deep (>40 inches). Soil surface textures are sandy to clayey depending on the depositional environment under which they were deposited. Often the soil profile consists of stratified layers of contrasting soil textures. The soil organic matter content is low (<1%). Soil drainage classes, as defined by depth to groundwater, are varied. Generally, it can be assumed that the water table is within 6 feet of the surface. Though depth to groundwater is generally shallowest nearer the water bodies, shallow groundwater can be encountered in locations set well away from the modern day channels where remnant stream channels are present.

Map 3 depicts the high leeching potential of the soils in the treatment area. Areas highlighted in RED indicate the presence of courser textured soils (fine sandy loams, sand loams, and loams and sands), shallow depth to groundwater, and/or soils formed along drainage ways. These are generally the soils with the highest leaching potential.

3.7 Vegetation

The vegetative community of the proposed project area is composed of grasses, forbs, and shrubs that transcends into Basin big sagebrush (*Artemisia tridentata* Nutt. ssp. *tridentata*) rangeland with associated grasses and forbs. A list of grass, forb, shrub, and tree species and invasive and noxious weeds identified for the proposed project area is found in Appendix 3. Most of the proposed BLH IPM project area is in Fire Regime II and III with present Condition Classes of 2 and 3. Three wildfires have occurred within the proposed treatment area.

Table 4. Wildfires that have occurred within the proposed BLH IPM area.

Wildfire Name	Wildfire Date
Manderson North	04/21/1990
Brake Railroad	04/26/1993
Slab	08/04/2004

3.7.1 Threatened and Endangered Plant Taxa

There are no threatened, endangered, or sensitive plant taxa within the area proposed for treatment.

3.8 Wildlife

A complete description of the fish, birds, and mammals found within the proposed project area can be found in the Bighorn River Habitat and Recreation Management Plan (1987).

3.8.1 Threatened, Endangered, and Sensitive Animals

There are no threatened, endangered, or sensitive animal taxa found within the proposed project area on BLM land. Bald eagle and raptor nests are found within the Bighorn River corridor, but are all on private land. There is one nest of burrowing owl, a BLM sensitive species, found within one mile of the proposed project area. (See Map 4)

3.9 Cultural and Historic Resources

The application of chemical treatments to the proposed project area by pedestrians, ATV mounted devices, or by fixed wing aircraft would not result in effects to known or unknown cultural or paleontological resources within the area.

3.10 Native American Religious Concerns

No American Indian Tribes have identified invasive plant species as important. We know of no American Indian Tribes currently collecting plants on BLM administered lands in the Worland Field Office for traditional or cultural uses.

4.0. Environmental Consequences

4.1 Assumptions for Impact Analysis

Malathion will be applied at the rate of 0.583 to 0.592 pounds of active ingredient per acre. This compares to recommended dosages ranging from 0.292-1.166 pounds of active ingredient per acre for insect pests on various agricultural crops.

Malathion is broken down relatively fast by hydrolysis and by the action of soil microorganisms. Actual degradation rates depend on prevailing conditions. The variety of mediums such as soil, water, foliage and air influences the rate of degradation. Factors such as acidity, temperature, moisture, presence of microbes, organic matter, and other factors influence the exact rate of breakdown of malathion within the medium. Malathion has particular chemical properties which reduces leaching and presents small risks to ground water. Malathion is not generally phytotoxic and is registered for use on a variety of vegetation, crops, and livestock.

Conclusions drawn in this EA are based in part on toxicological evaluation of laboratory and domestic animals and on professional judgment of BLM personnel. This is necessary because few studies have been performed to determine the effects of malathion on wildlife species. However, there have been many studies performed on the effects of malathion on laboratory and domestic animals. Correlations have been drawn from those laboratory studies on possible affects to wildlife populations.
The control of the BLH with malathion in rangeland and cultivated fallow fields has been performed for over 30 years in California. No major impacts to vegetation or wildlife have been reported.

Accidental spillage or treatment of malathion on non-target areas is possible due to vehicle or aircraft accidents, equipment malfunction, drift and miscommunication. While the possibility of accidents is recognized, they would probably be infrequent and isolated.

4.1.1 Impact Topics Dismissed from Detailed Analysis

Wilderness Areas

Wilderness Study Areas have been excluded from the proposed treatment area. Any proposals to apply the proposed BLH IPM treatments within wilderness study areas would be analyzed and authorized separately.

Noise

The potential impacts of treatment on noise levels will be the greatest when aircraft are used to apply malathion. Impacts from noise to the environment are temporary due to the relatively rapid movements of treatments performed away from populated areas.

4.1.2 Impacts

Soil

Soil compaction is expected to be minimal from operations and limited to existing roads. Vehicles, turning around on narrow dirt roads, would compact a small amount of soil to the edges of the road. Small amounts of dust from vehicles and aircraft would be created from activities with negligible impact. The amount of dust created by activities would vary with the types of soils and vegetation present and be temporary due to the mobility of treatment procedures through a specific area.

Malathion Field Dissipation

Varying rates of terrestrial dissipation have been reported for malathion in the literature. No residues were found in soil after the first year of an exaggerated application rate of 76.6 lb ai. /acre (Roberts et al, 1962 as cited in USEPA, 1975). After a 5 lb ai/acre application of malathion to Carringion silt loam., 83% degradation was observed in 3 days and 97% in 8 days (Lichtenstein & Schulz,1964 as cited in USEPA, 1975). A dissipation half life of less than .2 days was reported in California field applications of malathion at 1.16 lbs. ai/acre, once a week for 6 weeks (USEPA, 2000). It is generally accepted that the fastest dissipation of malathion in a terrestrial field setting is through microbial degradation (USEPA, 2000).

Malathion in Soil

Malathion is broken down relatively fast by hydrolysis and by the action of soil micro-organisms (Matsumura and Boush, 1966). Malathion does not absorb well to inorganic soil particles but binds tightly with organic matter.

Many values for malathion's half-life in soil have been reported: a) 5 days (Curley and Donohue, 1986); b) 1 day (USEPA, 1986); c) 7.5 to 11 days in soils with low organic content (Buckman and Brady, 1969). The range of values depends on soil's alkalinity, organic content, microbial population and chemical degradation.

The literature suggests that malathion will persist longer in dry, sandy, low nitrogen, low carbon, or acidic soils (Walker and Stojanovic 1973, as cited in USEPA, 2000). There are indications malathion is mobile in loamy sand and loam soils.

Malathion is usually broken down rapidly by microbial organisms in the soil. In the dry environment common to the treatment area, the soils are naturally low in organic matter and the microbial degradation would be slower.

Since it is not readily absorbed to soil particles, malathion has the potential to leach though the soil profile. Course textured soils, low organic matter content and high water tables all add to the leaching potential of malathion.

Malaoxon, a common degradation product of malathion in the soil, has a toxicity level similar to that of malathion. Degradation of malaoxon is primarily by basic hydrolysis and half-lives of 3.9 to 5 days were found for soils of pH 7.2 to pH 8.2 (Pascal and Neville 1976 as cited in USDA 1991). This indicates that basic hydrolysis will lead to rapid degradation of malaoxon under conditions found in soils in many BLH IPM survey areas.

Soil Microorganisms: Malathion was slightly toxic to the bacterium *Nitrobacter* sp. (Bollen, 1961) but caused complete inhibition of the cerium *Nitrosomonas* sp. (Garretson and San Clemente, 1968). Bacteria and fungi degrade malathion rapidly (Murry and Guthrie, 1980; Paris and Lewis, 1974 and Bourquin, 1977). Malathion application to a forested watershed caused short-term effects on micro-arthropods and no observed effects on bacteria, fungi, earthworms, or snails. Some populations of soil arachnids and insects may be reduced by malathion; populations would not be significantly altered (Giles, 1970). No significant alteration of earthworm population density by aerial spraying of malathion was found in field studies (Giles, 1970).

Air Quality

The potential impacts of BLH IPM on air quality include light increases in dust and pollutants from internal combustion engines of vehicles and aircraft. Amounts of these pollutants should be negligible to air quality except on a local, temporary basis.

Increases in ozone concentrations from the volatilization of malathion are also expected to be negligible. Malathion has a low vapor pressure and is essentially non-volatile. Airborne particles of malathion are not expected to contribute significantly to the formation of photochemical smog (USDA, 1991). Malathion has not been identified by the USEPA as a hazardous air pollutant to be regulated under Section 112 of the Clean Air Act.

Water

Water quality is related to the geography and geology of the surrounding area. Soil types, vegetative cover, precipitation, and topography determine the quality of the ground and surface water in a drainage basin.

Literature shows that malathion is short lived and is subject to hydrolysis (Mulla and Mian, 1981). The relatively quick degradation of malathion by ultraviolet light (USEPA, 1975) and hydrolysis reduces the potential for residues in soil or runoff. Malathion is hydrolyzed rapidly in water with pH>7 (Beyers and Myers, 1996).

Based on its rapid degradation and reported octanol-water partition coefficient, malathion is not expected to leach to ground water, especially when applied to high organic soils (NLM, 1988). However, malathion has been detected in ground water in three states (USEPA, 1992 as cited in USEPA, 2000). USEPA believes the monitoring data indicates malathion to have a potential for movement into ground water especially in soils with low organic material and high sand content (USEPA, 2000). Malathion has particular chemical properties, which reduces the potential for leaching presenting small risks to human and other animals' drinking ground water (USDA, 1991).

It is expected that extremely small quantities of malathion may leach from cultivated fallow fields and rangeland after major storms if the storms hit before complete degradation has taken place. Natural river water with a large amount of organic matter resulted in a half-life for malathion of 15 to 16 hours under sunlight photolysis (Wolfe et al., 1977 as cited in USDA, 1991). Malathion found dissolved in surface runoff would be available to bind with organic solids suspended in the water and would result in less malathion exposure to organisms living in or ingesting the water.

Aquatic Life

Adverse phytotoxic effects from malathion have not been reported on aquatic plants. Algae metabolize malathion rapidly into non-toxic components (Mulla and Mian, 1981). Fogging or aerosol applications of malathion on salt marsh plants showed no adverse effects (Dobroski and Lambert, 1984).

Impacts to aquatic animals vary according to species, duration of exposure and the quality, temperature, and flow rate of water. While malathion shows a range of moderate to high toxicity to fish species (USEPA 1975), aquatic invertebrates show the most sensitivity to malathion.

Should rain follow close behind a malathion application, or more critically, before the application can thoroughly dry, malathion may be washed from rangeland foliage and migrate toward small streams or ponds containing aquatic plants and wildlife. The potential for malathion in runoff is reduced if the application has sufficiently dried prior to a rain event and will continue to decline as the time between the application and the rain event increases.

The impacts malathion may have on aquatic life is a function of the following six variables (USDA, 1991): 1) volume of precipitation produced by a storm; 2) volume of rangeland runoff; 3) insecticide concentration in rangeland runoff; 4) quantity of insecticide washed into a stream or river; 5) the length of time the insecticides are in contact with the receiving organism; 6) stream volume and flow; 7) pH of stream. Additional environmental variables influencing potential malathion exposure to aquatic organisms in streams include; flow rate, volume of water in relation to surface area, subsurface recharge of stream flow, microscopic organism burden, temperature, shading, oxygenation, and bottom characteristics (Peterle and Giles, 1964).

Using the Groundwater Loading Effects of Agriculture Management Systems (GLEAMS), bare soils would have slightly higher runoff concentrations of malathion than vegetated areas. In this model, the greatest concentration in runoff occurs when soils have high runoff coefficients, poor quality vegetative cover, high clay composition, high portion of impervious surfaces, and steep slopes (USDA, 2002). Estimated insecticide concentration in runoff water from a sprayed water shed using GLEAMS was negligible with a storm intensity of 1 inch or less.

Although the possibility exists for malathion to enter aquatic water systems in runoff, the occurrence of such an event would be rare and isolated. In addition, actual field studies indicate that malathion in runoff or drift would be subject to a wide variety of environmental factors, many of which can degrade and shorten the half-life of

malathion under aquatic conditions. Measures to reduce potential runoff and drift into non-target areas are specified in the "Proposed Action". Treatments near water would be strictly avoided. Water is defined as any body of water, natural or human-made, that includes springs, wildlife guzzlers, ephemeral pools, stock ponds, reservoirs, streams, ditches, and canals.

Vegetation

The potential impacts of malathion on vegetation include effects on plant reproduction through the reduction of insect pollinators and direct toxicity to vegetation. The half-life of malathion on foliage ranges from 1 to 6 days (Matsumara, 1985; Nigg et al., 1981; El-Refai and Hopkins, 1972).

Phytotoxicity: Malathion is generally not phytotoxic to most plants and is registered on a wide variety of vegetation and crops (See Label in Appendix 2). When used properly at appropriate concentrations, malathion does not appear to injure vegetation. Adverse effects to conifers, clover, and pea plants have been observed in malathion concentrations applied above field application rates (Ilnytzky and Marshall, 1974; Archer, 1971; Chakraborti et al., 1983).

No phytotoxicity was observed in a forest watershed after several treatments of malathion at .72 lb. a.i./ acre (Giles, 1970). (In the "Proposed Action" malathion rates would be applied at 0.583 to 0.592 lbs. a.i. per acre.)

Indirect Impacts Caused by Decline of Pollinators: If the populations of insect pollinators (flies, bees, ants, beetles, etc.) are reduced as a result of malathion treatments, fruit set and the production of seed could be a result. Hymenopterous insects including honeybees and ants have been determined to be sensitive to malathion exposure (Dobroski & Lambert, 1984). The depression of hymenopterous insects would be temporary because foraging bees, wasps, and ants would continue to re-enter from adjacent non-treated areas. Honeybees could be quickly replenished from hives out of the treatment area and ant workers from ant colonies under ground where the queen, brood, and a large majority of workers are protected. Only a small percent of a nest's work force would be out at the time of the application.

Solitary bees and wasps are not members of colonies and foraging adults could not be replenished as quickly as from a social insect structure. The depression of solitary Hymenoptera may be temporary due to re-entry of solitary species from adjacent non-treated areas (Manser and Bennett, 1962). Research indicates that insects of certain orders are more susceptible to malathion than others. Beetles and populations of flies, except mosquitoes, were found unaffected by low volumes of malathion (Hill et al, 1971).

USFWS biological opinion speculated that the reproductive success of plants, due to a decline of pollinators by malathion treatments, may lead to a loss of plant population persistence. A possible reduction in the connectivity between plant populations and reduced diversity by increasing the potential for inbreeding depression was also referenced. (Pavlik and Manning 1993; Pavlik, et al. 1993; Barrett and Kohn 1991).

USFWS commented that many self-compatible plants are facultative and will also outcross and the seeds resulting from the out-crossing will be more fit than those produced by selfing. The need for some self-compatible plants to be physically manipulated by insect visitors was also referenced (Corbet 1997, Karron 1991).

Wildlife

The potential impacts of malathion on animals, apart from removing non-target ectoparasites, could include possible dermal and oral exposure.

Dermal exposure may result from the direct application of malathion during BLH treatment activities. Malathion is registered for the direct use on animals to control insects, mites, and ticks. The animals include sheep, hogs, goats, dogs, cats, cattle, horses, ducks, geese, and turkeys (Malathion 57, EPA # 5481-10-AA). The use of

malathion for this wide range of animals indicates a favorable safety margin between target pests and non-target higher terrestrial animals.

Oral exposures may result from grooming, ingestion, and inhalation. Oral LD50's for malathion in laboratory and domestic animals vary.

Malathion's low solubility and low-octanol-water partition efficiently contribute to a low bioaccumulation potential. Malathion has a low potential for accumulating in lipids (Dobroski and Lambert, 1984). A half-life for one hour was reported for retention after exposure to malathion (Kenaga and Goring, 1980; as cited in Dobroski and Lambert, 1984). Few field studies have been performed on the direct effects of malathion on wildlife. A review of the limited literature sources shows wildlife to have a general tolerance to malathion applied at rates used to control insects. Based on a general comparison of field studies, malathion applied at the rate of 0.583 to 0.592 lbs. of a.i./acre will not adversely affect wildlife populations.

Mammals: Malathion is moderately toxic to mammals. Potential dermal or oral exposure to malathion is dependant on dose and mode of exposure. The lowest oral LD50 values for rabbits, rats, and mice are 250, 370 and 507 mg/kg, respectively (NIOSH, 1987; as cited in USDA, 1991). A study in Michigan found no significant adverse effects on mammals and birds in areas treated with 1 lb. a.i./acre of malathion (DOI, 1963). According to the USEPA, the no observable effect dose of malathon from chronic administration to laboratory rodents is 4mg/kg/day. For a single dose, it is 50 mg/kg. The low observable effect dose for inhalation is 0.1mg/l based on a 90-day inhalation study. The effect seen at the next dose tested is a measurable decrease in cholinesterase enzyme activity in blood samples, an effect that is reversible (USEPA , 2000a)

Reptiles and Amphibians: Impacts of malathion on reptiles and amphibians have not been widely studied in the field and little information is available to aid in assessing impacts of the proposed IPM activities. Oral exposure of lizards to malathion has been studied in the laboratory (Hall and Clark, 1982; Özelmas and Akay, 1995).

Both reptiles and amphibians were unaffected by the treatment of a watershed with malathion at the rate of 0.7 lb. a.i./acre (Giles, 1970). In the “Proposed Action”, malathion rates are applied at 0.583 to 0.592 lbs. a.i./acre. Malathion was applied in seven low volume, high concentration sprays in the Presidio Valley in Texas. No malathion residues were detected in lizard tail muscle, brain tissue, liver, coelom fat, and stomach contents (Culley and Applegate, 1967). Laboratory studies have shown frog larvae to be sensitive to malathion. A 50% mortality of western chorus frog larvae, *Pseudacris triseriata*, was observed in fixed concentrations of malathion at 0.56 mg/L for 24 hours, and 0.20 mg/L for 96 hours. The LC50's for Fowler’s toad larvae, *Bufo woodhousei fowleri*, were found to be 1.9 mg/L for 24 hours, and 0.42 mg/L at 96 hours (Devillers & Exbrayat, 1992; Mayer & Ellerseick, 1986).

Fish and Aquatic Invertebrates: Malathion can be moderately to highly toxic to fish. Toxicity is largely dependant on fish species, exposure time, water quality, and temperature (USEPA, 1975; Mayer & Ellerseick, 1986). The 96 hr LC 50's for species such as black bullhead and goldfish range from 10-11.7 mg/L while species such as green sunfish, bluegill, and walleye were found to have much lower LC50's, between 0.030-0.146 mg/L (Mayer & Ellerseick, 1986). The most susceptible fish families were found to be trout, salmon, perch, and sunfish and the least susceptible included catfish and minnows (Macek and McAllister, 1986).

Aquatic invertebrates show the most acute sensitivity to malathion. The LC50's range from 0.0007 to 0.032 mg/L for daphnia exposed for 48 hours and stonefly, caddis fly, grass shrimp, and scuds exposed for 96 hours (Mayer & Ellerseick, 1986). Differences have been found in the ability of malathion to affect fish and aquatic invertebrates under actual field conditions versus laboratory studies. At application rates to control mosquito and rice pests, no effects were observed on crustacean species including shrimp, plankton, and red crawfish (Tagatz et al., 1974; Wall & Marganian, 1971; Muncy & Oliver, 1963). Malathion applied in a forest watershed at 0.7lb ai/acre reduced aquatic insect populations but rapid recovery was observed (Giles, 1970). Fish and crayfish found to be sensitive to malathion in the laboratory were found to be unaffected in the stream bed.

The surveillance of fish and aquatic invertebrate populations was studied (Kuhajda et al., 1996). Malathion treatments in cotton fields were applied to the edge of the creek bed in a worst-case scenario. The conclusion based upon their data was that no adverse acute or long-term effects of malathion were evident in either the fish or aquatic invertebrate communities based upon numbers of individuals, numbers of taxa, and diversity indices over the 3-year study period. USDA concluded that any applications of malathion in grasshopper programs, designed to avoid water, would not be expected to have any adverse acute or long-term effects on fish and aquatic invertebrates as cited in (USDA 2002 & USDA 2005).

Potential malathion exposure to aquatic species in the proposed IPM program could result from spray drift or from runoff should a rain event follow close behind treatment application. Strategies have been adopted to avoid impacting non-target aquatic habitats. The potential toxic effects of malathion to aquatic organisms could be reduced due to the rapid natural hydrolysis of malathion in waters with pH > 7 (USDA, 2002). Within program survey areas, the pH of creeks ranges from 7.6 to 8.0. A pH of 7.8 was measured in East Hanover Irrigation Canal.

Birds: Oral exposure to malathion from BLH IPM activities may result from grooming, feeding, and inhalation. Such exposure is expected to be minor and would not cause major impacts. The reported oral LD50 for various birds are as follows: Chicken 150-850 mg/kg (USEPA, 1975), pheasant 167 mg/kg, horned lark 403 mg/kg (Hudson et al, 1984),and mallard duck 1,484 mg/kg (Smith, 1987).

Dermal exposure may result from direct application of malathion to the environment. Malathion is registered for the control of mites and ticks on chickens, ducks, geese, and turkeys which indicates a safety margin for exposure for large birds (Malathion 57, EPA # 5481-10-AA).

Malathion, being a broad-spectrum pesticide, can cause reductions in invertebrate food sources of birds foraging in treated areas. The effects of malathion treatments to control grasshoppers found that the availability of invertebrates for foraging birds was significantly reduced following treatments. Nesting birds were observed switching diets to remaining insects and were as reproductively successful as birds in untreated plots (McEwen et al, 1996; Howe, 1993; Howe et al, 1996 and 2000).

In field studies, no major effects to birds and mammals were found in areas of Nebraska treated with 0.5 lb. a.i./acre. Domestic turkeys held in cages in the treated area were allowed to eat insects and had slightly depressed plasma cholinesterase levels, but no external symptoms were noted (USDA, 1985).

Many of the bird and mammal species found in the affected environment will likely be subject to short duration disturbances from both aerial and ground treatment applications of herbicides and insecticides. These species should return to their preferred habitats once disturbance has ended.

Insects

Malathion is a broad-spectrum pesticide. Non-target insects and other arthropods will be killed by malathion treatments. Reductions in populations of non-target arthropod species would be anticipated immediately following treatment. Because various insect groups vary in susceptibility to malathion, temporary changes in the composition of insect populations may also occur within the treatment areas. Soft-winged flower beetles, ladybird beetles, green lace wings, crickets, grasshoppers, plant bugs, and wasps have shown a greater susceptibility to malathion than other insect groups. This effect is expected to be temporary due to the rapid decomposition of malathion in the environment, high reproductive rates for insects, and the migration of insects from adjacent non-treated areas. The rate at which insect populations re-colonize a treated area depends on their biology and densities in untreated areas nearby.

The effects of malathion, applied at Proposed Action rates, on non-target organisms was studied in Wyoming. Researchers concluded that the sprays are not likely to have a large impact on non-targets due to their protection by plants, nests, and soil. Arthropods likely to be affected are those inhabiting foliage during the day. Individual ants foraging on plants during treatments were affected but colonies of all ant species were not affected (Pfadt et al., 1985).

The effects of large-scale insecticide applications to control grasshoppers in rangeland were found to have little long-term impact on non-target arthropod species examined. Four species of ground beetles and three species of darkling beetles rebounded to pre-treatment levels 12 months after treatment. One species of beetle may have been affected (Swain 1986 & Quinn et al. 1990, 1991, 1993). Field crickets, ichneumonid wasps, and blister beetles, as groups, rebounded to or above pretreatment levels (Quinn et. al., 1993).

Long-term decline of insect populations from repeated annual treatments is not anticipated. BLH control is accomplished because: 1) BLH's are generally found only in areas proposed for treatment and 2) those BLH's not affected by treatment will be migratory toward green agricultural areas and are generally not a major part of the rangeland ecosystem after host plants have dried.

BLH Resistance to Malathion: Resistance to malathion by BLH in the field has not been observed. The IPM proposed is a control program, therefore treatments would not be continuous and would generally be performed only once a year in a relatively small portion of the BLH's range. A tendency towards resistance to malathion would be predicted if all three annual BLH generations were exposed to malathion.

4.2 Cumulative Impacts

Cumulative impacts are those impacts on the environment that results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of the agency or person that performs such actions.

A combination of actions effect ecosystems and sensitive species within the Program's BLH survey areas. Destruction of natural ecosystems have been evident in recreational activities such as off-road vehicle use, hunting, camping, oil, gas, and mineral exploration, livestock grazing, agriculture, industrial and vehicular air pollution, poaching, fire, drought, predation, disease, and competition from introduced species.

Agriculture in its many forms has the most wide reaching effects in changing the habitat for many sensitive, threatened, and endangered species. In addition to the application of malathion to rangeland for control of the BLH, additional pesticides may also be used to control noxious weeds within the BLH IPM treatment area. APHIS Grasshopper and Morman Cricket Management Program, administered by USDA, utilizes block or buffer treatments for the control of grasshopper infestations that threaten food, fiber, and grasslands. The USDA works closely with other federal and state agencies and private landowners to control extremely large grasshopper populations on public and private lands. Grasshopper control within the BLH IPM treatment survey area would be rare.

Herbicides are used to control noxious weeds within the BLH survey boundaries. Acreages of tamarisk, Canada thistle, white top and Russian knapweed are routinely treated. Federal, state, and county agencies may be involved in the survey and eradication of noxious weeds.

Oil and gas exploration and production has profoundly modified, over a limited area, the habitat of native plants and animals.

Off-road vehicle use has posed a threat to some plant species

Although many factors are contributing to the degradation of natural habitat in the Bighorn Basin, efforts are being made to reverse trends of habitat disruption and the decline of species. Protection for sensitive, threatened, or endangered species is provided by federal and state legislation. Habitat identified to be crucial to the survival of sensitive species may be recommended by federal, state, or local agencies. The Governor's Wildlife Trust fund is providing money to perform vegetation and ecosystem treatment to enhance wildlife habitat.

Management plans provide guidance for the management of a sufficient portion of habitat to maintain viable populations of species in decline.

The direct and indirect effects of the "Proposed Action" are minor and should not significantly add to or increase cumulative impacts. Malathion breaks down within 1-4 days of application; residue build up is not anticipated from single annual treatments. Studies have shown that insect populations re-establish rapidly within several months of treatment and would not experience long-term decline from repeated annual treatments. Therefore, the "Proposed Action" will not substantially add to the effects of past, present, and reasonably foreseeable future actions described in the preceding discussion of this EA.

4.2.1 ALTERNATIVE 2- REDUCED PROJECT ALTERNATIVE

Under the Reduced Project alternative, the BLM would apply weed herbicide and prescription burn treatments but would not allow the County Weed and Pest Districts to aerially apply malathion to BLM lands.

The Reduced Project alternative would eliminate all negative and positive impacts to public lands previously discussed in the "Proposed Action" that pertain to malathion application.

Impacts to Soil

Same as "Proposed Action"

Impacts on Air Quality

Same as "Proposed Action"

Impacts to Water.

Same as "Proposed Action"

Impacts to Aquatic Life

Same as "Proposed Action"

Impacts to Vegetation

Same as "Proposed Action"

Impacts to Wildlife

Same as "Proposed Action"

Impacts to BCTV Susceptible Crops

Impacts to BCTV susceptible host crops are expected to be similar to the "Proposed Action" with the addition of:

1. Increased potential for small to medium BCTV outbreaks from BLH populations migrating from important historical breeding grounds located on untreated public lands. Due to the high ratio of public to private lands, large BCTV outbreaks in host crops would be expected.

2. The increased use of insecticides to control BLH migrating from public lands to private agricultural lands;

3. Potential localized crop loss; and

4. Untreated public lands could act as a reservoir for BCTV and the BLH, increasing the potential for re-infesting adjacent treated lands.

Cumulative Impact

The overall cumulative impact of this alternative is expected to be the same as the "Proposed Action".

4.2.2 ALTERNATIVE 3 - NO ACTION

Under the No Action alternative, the BLM would not apply weed herbicide and prescription burn treatments and would not allow the County Weed and Pest Districts to aerially apply malathion to BLM lands.

Where no treatment occurred, both BLH populations and BCTV would increase and become a threat to a wide range of agricultural crops and home gardens. Financial losses to agricultural producers could be great.

Potential impacts of No Action are expected to be: 1) increased non-native weed species on public lands; 2) decreased browse and graze for wildlife and livestock using public land 3) increased wildland fire in area of dried weed and shrub vegetation; 4) increased potential for insecticide residue on produce; and 6) potential increases in air and ground water contamination from increased use of insecticides in crops.

Cumulative Impact

The absence of BLH control would have little cumulative impact beyond what is occurring as a result of other actions and be similar to the "Proposed Action".

5.0 Mitigation

The Bureau of Land Management is required to follow all state and federal laws and regulations applicable to the application of herbicides. The following mitigation measures would be followed when applying herbicides:

Herbicides would not be directly applied to water unless they are labeled for such application.

Applicators would be required to wear long-sleeved shirts and long pants, boots plus socks, and other personal protective equipment (PPE) as required on the label.

Herbicides would be secured (lock and key) at all times.

Herbicides would be transported according to safety requirements.

Ester formulations of triclopyr (Garlon 4) would not be applied in the summer when high temperatures (over 85° Fahrenheit) can cause volatilization.

No spraying activity can occur in raptor or bald eagle buffer zones until after 1 July.

No malathion spraying activity would occur in raptor buffer zones until after July 31 (see map 2).

6.0 Consultation and Coordination

6.1 Preparer

Eve Warren, PhD, Natural Resource Specialist, Bureau of Land Management

6.2 Persons and Agencies Consulted

The following persons and their associated agencies were consulted:

Mike Bies, Cultural Resource Specialist, Bureau of Land Management
Mark Dallon, Hydrologist, Bureau of Land Management
Jarrod Glanz, Washakie County Weed and Pest District Supervisor
Karen Hepp, Rangeland Management Specialist, Bureau of Land Management
Jeff Johnson, Recreational Specialist, Bureau of Land Management
Steve Kiracofe, Soil Scientist, Bureau of Land Management
Rance Neighbors, Weed Coordinator, Bureau of Land Management
Tim Stephens, Wildlife Biologist, Bureau of Land Management
Eve Warren, Natural Resource Specialist, Bureau of Land Management
Chet Wheeless, Fisheries Biologist, Bureau of Land Management
Jim Wolf, Fuels Program Manager, Bureau of Land Management

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Administrative Review or Appeal Opportunities
Provision for Protest and Appeal

This wildland fire management decision notice, issued on 23 February 2006 constitutes the proposed decision document for the purpose of protests under 43 CFR Subpart 4160 — Administrative Remedies.

Please be advised that 43 CFR Part 4 has been amended as of January 9, 2004.

Any applicant, permittee, lessee, or other interested publics may protest a proposed decision under Sec. 43 CFR 4160.1 and 4160.2, in person or in writing to Worland Field Manager, Bureau of Land Management, 101 S. 23rd Street, P.O. Box 119, Worland, Wyoming 82401 within 15 days after receipt of such decision. The protest, if filed, should clearly and concisely state the reason(s) as to why the proposed decision is in error.

In accordance with 43 CFR 4160.3 (a), in the absence of a protest, the proposed decision will become the final decision of the authorized officer without further notice unless otherwise provided in the proposed decision.

In accordance with 43 CFR 4160.3 (b) upon a timely filing of a protest, after a review of protests received and other information pertinent to the case, the authorized officer shall issue a final decision.

Any applicant, permittee, lessee, or other person whose interest is adversely affected by the final decision may file an appeal in accordance with 43 CFR 4.470 and 43 CFR 4160.3 and 4160 .4. The appeal must be filed within 30 days following receipt of the final decision, or within 30 days after the date the proposed decision becomes final. The appeal may be accompanied by a petition for a stay of the decision in accordance with 43 CFR 4.471 and 4.479, pending final determination on appeal. The appeal and petition for a stay must be filed in the office of the authorized officer, as noted above. The person/party must also serve a copy of the appeal on any person named [43 CFR 4.421(h)] in the decision (see cc list following the signature line) and the Office of the Solicitor, 755 Parfet Street Suite 151, Lakewood, Colorado 80215.

The appeal shall state the reasons, clearly and concisely, why the appellant thinks the final decision is in error and otherwise complies with the provisions of 43 CFR 4.470.

Should you wish to file a petition for a stay, see 43 CFR 4.471 (a) and (b). In accordance with 43 CFR 4.471(c), a petition for a stay must show sufficient justification based on the following standards: (1) the relative harm to the parties if the stay is granted or denied; (2) the likelihood of the appellant's success on the merits; (3) the likelihood of immediate and irreparable harm if the stay is not granted, and (4) whether the public interest favors granting the stay.

As noted above, the petition for stay must be filed in the office of the authorized officer (Assistant Field Manager, Resources) and serviced in accordance with 43 CFR 4.473. Any person named in the decision from which an appeal is taken (other than the appellant) who wishes to file a response to the petition for a stay may file with the Hearings division a motion to intervene in the appeal, together with the response, within 10 days after receiving the petition. Within 15 days after filing the motion to intervene and response, the person must serve copies on the appellant, the Office of the Solicitor and any other person named in the decision (43 CFR 4.472(b)).

For additional information concerning this decision, contact the Bureau of Land Management, Worland Field Office, PO Box 119, Worland, Wyoming 82401-0119, (307) 347-5100.