

FINAL

Environmental Assessment
For Control of
***Phragmites australis* in South Carolina**

U. S. Army Corps of Engineers
Charleston District

September 2005

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Environmental Assessment For Control of *Phragmites australis* in South Carolina

I. AUTHORITY AND PURPOSE

The purpose of this document is to describe the environmental effects of proposed management efforts for *Phragmites australis* in the coastal region of South Carolina. The Army Corps of Engineers Charleston District provides funding to the South Carolina Department of Natural Resources (SCDNR) for this purpose. The actual management efforts are carried out by SCDNR.

The Federal Aquatic Plant Control Program provides cost-share funding to SCDNR for the management of nuisance aquatic vegetation in public waters. It is authorized under the following authorities:

- Section 104, 1958 RHA (Public Law 85-500), as amended.
- Sections 103(c) (6) and 941, of the Water Resources Development Act of 1986 (Public Law 99-662). This is a continuing authority.
- Sections 225 and 540 of the Water Resources Development Act of 1996 (Public Law 104-303).

II. BACKGROUND

A. General Plant Information

Phragmites (Phragmites australis), also known as common reed, is a tall, coarse perennial grass with stout rhizomes, deep seated in the substrate. Stems are up to 4.5 m tall, 5 to 15 mm thick, leafy throughout, the sheaths overlapping with a large, dense, terminal panicle. The leaves are flat, stiff, 1 to 6 cm wide and up to 60 cm long, tapering to long-attenuate tips. Leaf margins are serrate. The panicle is terminal, plume-like, purplish or silvery, 15 to 50 cm long, with many branches. The flowers have long, silky hairs.

The plant is found in marshes and in shallow water along the shoreline of lakes, ponds, swamps, ditches, streams, canals, rivers, and estuaries. It may produce large quantities of seed, but in many cases very few are viable. The seed will not germinate in more than about 5 cm of water (Marks et al. 1994). Once established, *Phragmites* spreads by rhizomes and stolons and often forms dense, monospecific colonies along shorelines and shallow water areas. Rhizomes are reported to grow up to about 2 m per year and be as long as 20 m (Batterson & Hall 1984).

B. Distribution and Range

The species occurs in every state in the continental U.S. In particular, *Phragmites* has been problematic in the northeast where it has impacted marshlands in New York and New Jersey and adversely impacted waterfowl management areas in Delaware. It was recognized as a potential nuisance species in South Carolina in the mid 1980's based on initial invasions in waterfowl impoundments at Santee Coastal Reserve and the Tom Yawkey Center.

In South Carolina, occurrence has been observed to be limited to the outer coastal plain in fresh, brackish and salt marshes and along streams, rivers and estuaries. The extent of *Phragmites* coverage on public and private property in South Carolina is not well known. Based on conversations with federal and state land managers, the best estimate of infestations on federal property is about 1500 acres and state property is about 1400 acres. Coverage on private property may be equal to that on public lands, so total coverage could be about 6,000 acres. The greatest concentration appears to be in the Winyah Bay area, but populations are also known to occur in the Edisto River area and as far south as the Savannah River near Highway 17.

C. Invasive Nature and Effects of *Phragmites* Invasion

Phragmites is typically the dominant species in environments where it occurs, to the extent that it may form dense monocultures in excess of 300 culms per square meter (Hara et al. 1993). Colonies have been observed to establish in low marsh areas and expand to even lower areas, which aren't favorable for seed germination or transplant, by clonal integration (Amsberry et al. 2000).

Although *Phragmites sp.* is native to North America, there is evidence that an introduction of a non-native genotype has occurred (Saltonstall 2002). Studies indicate that the introduced (European) variation has displaced native types and broadened the historical range of *Phragmites*. The non-native type is not visually distinct from the indigenous, making this a "cryptic invasion" and difficult to fully understand the extent of the invasion. *Phragmites australis* is officially listed by the State of South Carolina as an illegal plant.

The presiding concern over monotypic stands of common reed is the habitat value of invaded wetlands. Areas along the South Carolina coast typically managed for migratory water fowl and dominated by widgeon grass (*Ruppia maritima*), a principle food source, have been transformed. There is some question as to the viability of *Phragmites* stands as duck habitat. Research into the overall usage of *Phragmites* stands by birds shows that significantly fewer numbers of species use the habitat (Benoit & Askins, 1999).

Of late, there have been many scientific investigations into ecological changes as a result of *Phragmites* invasion. There have been varying results depending on the trophic level observed in the ecosystem during the study. Larger nekton and benthic infaunal communities were observed to not differ significantly between wetlands dominated by different macrophytes compared to *Phragmites* (Posey et al., 2003; Hanson et al., 2002; Able and Ragan, 2000). However, in the Able and Ragan study, differences were observed in the abundance of small juvenile fish.

Evidence does suggest that usage during different life stages by blue crabs (*Callinectes sapidus*) is influenced by marsh surface habitats, a factor that significantly changes with the existence of Phragmites (Jivoff and Able, 2003).

The effects on nutrient cycling have likewise been characterized. Phragmites has been observed to alter the pathway of the nitrogen cycle by storing greater amounts of the nutrient within the biomass (Windham & Ehrenfeld 2003). In addition, a study of sediment nutrient budgets reveals that restoration of invaded areas to a more biodiverse plant community reduces the ability of wetland to act as a nitrogen sink (Findlay et al. 2003). Similarly, biomass production has been shown to be more concentrated on Phragmites rather than other primary producers such as benthic macroalgae by investigating carbon isotope concentrations (Curren et al. 2003).

III. PROPOSED ACTIVITIES

For a period of at least five years, treatment of an estimated 6,000 acres of Phragmites infested wetlands is planned. Treatments will consist of an initial prescribed burn in the fall or winter (if possible/feasible) followed by application of herbicide when the spring growth of Phragmites appears. The herbicide to be used is Habitat[®] (description of the chemical, in the form of the material safety data sheet, can be found in Appendix A) and will be performed using a spray application from helicopter, truck, or boat depending upon the size of the area to be treated. Burning of the previous year's biomass prior to application of the herbicide allows the greatest coverage of existing foliage. Follow-up treatments, which may or may not be federally funded in subsequent years, may be needed to help ensure long-term control. The herbicide amount to be applied is to be that which is in accordance with the manufacturer's instruction.

The new herbicide, Habitat[®], is registered by the EPA and was approved for use in the State of South Carolina by the Clemson University Department of Pesticide Regulation in 2004. The active ingredient (imazapyr) appears to provide much better control than previously available herbicides (Kay 1995, Nelson 2005). Test treatments by the SCDNR and other agencies under an experimental use permit from Environmental Protection Agency indicate that imazapyr is much more effective than glyphosate (the active ingredient in Rodeo[®]) in providing long-term control. In calendar year 2004, the SCDNR treated 200 acres at the Yawkey Center, 494 acres at Santee Coastal Reserve, and 12 acres in the ACE Basin using Habitat. Due to limited funding, only part of the known Phragmites can be treated each year. This management strategy should reduce Phragmites coverage over time.

SCDNR has recognized that a two-pronged management strategy is needed: 1) expanded and coordinated control of known Phragmites populations on public and private properties and 2) comprehensive survey of Phragmites along the coast. A comprehensive survey of the coast is needed to document the extent of coverage and to help develop a long-term management plan.

IV. ALTERNATIVES TO THE PROPOSED ACTION

Alternatives for control of nuisance aquatic vegetation include:

A. Chemical Control A number of herbicides are available and designed specifically to control aquatic vegetation. These products are tested and registered by the Environmental Protection Agency and state agencies for use in water. When used according to label directions and applied by licensed/certified applicators, these products are environmentally safe and effective in controlling the growth of a variety of plant species including Phragmites and can result in an increase in plant biodiversity (Ailstock et al. 2001). However, previous control efforts using other herbicides have generally been short-term and repeated treatments are usually needed. Most herbicides carry water use restrictions related to fishing, drinking, and irrigation. The selection of which herbicide to use is based on the effectiveness on the target species, the cost, and environmental and water use constraints in the waterway.

The South Carolina's Aquatic Plant Management Program (formerly with the Water Resources Commission but now with the SCDNR) has assisted with Phragmites control operations since 1985 treating 1,812 acres. Treatment has been limited primarily to the aquatic herbicide Rodeo[®] (glyphosate), which provided only partial control and required frequent repeat treatments. The control strategy was to reduce Phragmites populations over time with annual treatments; however, the extent of control was less than desired and, at best, treatments have helped slow the spread of Phragmites on these properties.

B. Biological Control The advantages of biological control agents are long-term control, cost effectiveness, and the avoidance of potential toxic effects to aquatic life and water users that can be associated with misuse of chemical control agents. Another advantage is that some biocontrol agents control only the target species of concern. The major disadvantage is that currently there are not many biological control agents available to control aquatic plant species in general and few that are specific for certain species and achieving control can take a long time. Biological control agents that have been effective in South Carolina include the alligatorweed flea beetle (*Agasicles hygrophila*), alligator weed thrip (*Amynothrips andersonii*), alligatorweed stem borer moth (*Vogtia malloi*), as well as the fish Tilapia (*Tilapia sp.*), and sterile grass carp (*Ctenopharyngodon idella*). There are no viable biological controls for Phragmites that are applicable to South Carolina.

C. Mechanical Harvesting Physical removal of aquatic vegetation from the water body using harvesting machines can be quite beneficial, particularly where 1) the vegetation is dense and composed of a variety of species, 2) immediate results are needed, and 3) the acreage is small. Disadvantages to this method of control include: 1) the need for a disposal site for harvested vegetation, 2) this type of control is expensive, and 3) it is not applicable in areas where there are stumps or downed timber. This method has been eliminated due to cost considerations.

D. Hydrologic Manipulation The use of water control structures has been successful in controlling Phragmites populations. Installation of dikes allows managers to control the level of water and to some extent the salinity of impoundments to produce an undesirable environment for the plant. These structures are expensive to build and are often not feasible in large areas due to this factor. Land owners may have objections to the alteration of property and these methods require active management. This method has been eliminated due to cost considerations and its limited applicability (i.e., this method would only be cost effective to areas that are presently diked, which is a less than half of the total acreage of Phragmites).

E. No Action Depending on the severity of the aquatic plant infestation and its current and potential impact on water use activities and/or the aquatic environment, control may or may not be necessary. Each water body is evaluated depending on a number of factors including but not limited to the type of plant species present, the potential of spreading, the number and degree of impaired uses, the type of treatment proposed, the cost of the treatment, and the availability of funds. Concern for the viability of the migratory waterfowl population precludes this alternative.

V. THREATENED AND ENDANGERED SPECIES

There are thought to be no threatened or endangered plant species which typically occur in the same environs inhabited by Phragmites in the area of proposed treatment addressed in this Environmental Assessment. The likelihood of any detrimental affect to threatened or endangered animals is remote due to the properties of the herbicide proposed for this application. However, elimination of dense stands of Phragmites may provide feeding habitat for bald eagles and wood storks.

A list of threatened or endangered species under the jurisdiction of the U.S. Department of the Interior, Fish and Wildlife Service for the South Carolina coastal counties of Berkeley, Charleston, Colleton, Beaufort, Jasper, Horry, and Georgetown are available in Appendix B.

VI. ENVIRONMENTAL IMPACTS

A. Aquatic Animals Imazapyr, the chemical common name for Habitat[®] Herbicide, has been shown to have little toxicity to both terrestrial and aquatic organisms. It is non-carcinogenic, non-mutagenic, non-teratogenic. Neither is the herbicide a reproductive toxin. Due to the chemical readily being degraded by light and microbial activity, it is not known to bioaccumulate or bioconcentrate. (Tatum 2004)

B. Water Quality Study of the chemical imazapyr in estuarine environments shows that imazapyr's persistence in water and sediment is very short on the order of 40 hours (Patten 2003). In the long term, nutrients (nitrogen, carbon, etc.) in the treated wetlands are expected to return to normal cycles and dissolved oxygen in the water column is expected to improve due to the removal of the vast amount of Phragmites biomass.

C. Aquatic Plants Habitat[®] is not selective in its affect on plant species. However, the application can be very selective. Targeting of infested areas will be performed with the greatest care possible to minimize impacts to desirable native species and plant communities. The purpose of the treatment is to defoliate the entire treatment area, the treatment area being only those occupied by Phragmites, with the purpose of allowing a more diverse community to reestablish (Ailstock, et al. 2001). This herbicide does not control aquatic plants that are completely submerged or have the majority of their foliage submerged. Appendix C contains manufacturer's information on the affect of Habitat[®] on aquatic plants.

D. Air Quality Prescribed burns of the infested areas will cause a temporary plume of smoke and ash. The burn will release chemicals to include, but not limited to, ozone, carbon dioxide, nitrogen oxides, and sulfur dioxides. Particulate matter will reduce visibility and cause an odor. The associated plume will be dissipated in time depending on the prevailing winds.

VII. FINDING OF NO SIGNIFICANT IMPACT (FONSI)

Based upon the attached Environmental Assessment and in consideration of other pertinent documents, I conclude that the environmental effects resulting from the use of prescribed burns and Habitat[®] herbicide to control Phragmites are not substantial, and that there are not significant new circumstances or information relevant to environmental concerns that warrant the preparation of an Environmental Impact Statement. Specific factors considered in making this Finding of No Significant Impact include the following:

1. Water quality is not significantly affected.
2. Wetlands are not significantly affected.
3. No cultural resource is affected.
4. No significant adverse impacts to threatened or endangered species will occur.
5. No significant land use changes will occur.
6. Air and noise quality will not be significantly affected.
7. Fish and wildlife are not significantly affected.
8. Benthic invertebrate communities are not significantly affected.

Date 24 September 2005



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Lieutenant Colonel, EN
Commander, US Army Engineer District,
Charleston

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APPENDIX A

Material Safety Data Sheet for Habitat[®] Herbicide

MATERIAL SAFETY DATA SHEET

Agricultural Products Group
 P.O.Box 13528,
 Research Triangle Park, NC 27709
 (919) 547-2000

EMERGENCY TELEPHONE NUMBERS:

BASF Corporation: 1 (800) 832-HELP

CHEMTREC: 1 (800) 424-9300

Product No.: 58A119

Habitat® Herbicide

Date Prepared: 9/22/2003 Date Revised: 1/21/2004

SECTION I

Trade Name: Habitat® Herbicide

Chemical Name: 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid, salt with 2-propanamine (1:1)

Synonyms: Isopropylamine of imazapyr; AC252, 925; Formula: C(13)H(15)N(3)O(3).C(3)H(9)N

Chemical Family: Imidazolinone

Mol Wt: 320.4

SECTION II - INGREDIENTS

COMPONENT	CAS NO.	%	PEL/TLV - SOURCE
Isopropylamine salt of Imazapyr	81510-83-0	28.7	0.5 mg/m ³ TWA BASF recommended
Inerts	N/A	71.3	None established

SARA Title III Section 313: Not listed

SECTION III - PHYSICAL DATA

BOILING/MELTING POINT@760mm Hg: N/D pH: 6.6 - 7.2

VAPOR PRESSURE mmHg @ 20°C: N/D

SPECIFIC GRAVITY OR BULK DENSITY: 1.04 - 1.07 g/mL

SOLUBILITY IN WATER: Soluble

APPEARANCE: Clear blue liquid ODOR: Ammonia INTENSITY: Slight

SECTION IV - FIRE AND EXPLOSION DATA

FLASH POINT (TEST METHOD): >210°F SFCC AUTOIGNITION TEMP: > 200°F

FLAMMABILITY LIMITS IN AIR (% BY VOL): LOWER: N/D UPPER: N/D

NFPA 704 HAZARD CODES

HEALTH: 1 FLAMMABLE: 1 INSTABILITY: 0 OTHER: N/R

NFPA 30 STORAGE CLASSIFICATION: Class III B

EXTINGUISHING MEDIUM Use water fog, foam, CO(2), or dry chemical extinguishing media.

SPECIAL FIREFIGHTING PROCEDURES Firefighters should be equipped with self-contained breathing apparatus and turnout gear.

UNUSUAL FIRE EXPLOSION HAZARDS None known.

SELECT ACRONYM KEY

N/A - Not available; N/D - Not determined; N/R - Not rated; N/E - Not established

SECTION V - HEALTH DATA**TOXICOLOGICAL TEST DATA:**

Data for formulated product:

Rat, Oral LD50 (combined sexes) > 5000 mg/kg

Rabbit, Dermal LD50 (combined sexes) > 2000 mg/kg

Rat, Inhalation LC50 (4 hr) > 4.62 mg/L

Rat, Inhalation LC50 (1 hr calculated) > 18.48 mg/L

Rabbit, Eye Irritation - Not Irritating

Rabbit, Skin Irritation - Mildly irritating

Guinea pig, Dermal Sensitizer - Not Sensitizer

OSHA, NTP, or IARC Carcinogen: Not listed.

EFFECTS OF OVEREXPOSURE:

See Product Label and Directions For Use for additional precautionary statements.

CAUTION

Avoid contact with skin, eyes, and clothing. Avoid breathing spray mist.

Existing medical conditions aggravated by this product:

None known.

FIRST AID PROCEDURES

If on skin: Wash with plenty of soap and water. Get medical attention if irritation persists.

If in eyes: Flush eyes with plenty of water. Call a physician if irritation persists.

If inhaled: Remove victim to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. Get medical attention.

If swallowed: Call a physician or Poison Control Center. Drink 1 or 2 glasses of water and induce vomiting by touching back of throat with finger. If person is unconscious, do not give anything by mouth and do not induce vomiting.

Note to physician: Treat symptomatically. No specific antidote.

Note: Have the product container or label with you when calling a poison control center or doctor or going for treatment.

SECTION VI - REACTIVITY DATA

STABILITY: Stable. Do not store below 32° F or above 100° F.

CONDITIONS TO AVOID: Store in original container in cool, dry, well ventilated place away from ignition sources, heat or flame.

CHEMICAL INCOMPATIBILITY: Oxidizing agents and reducing agents.

HAZARDOUS DECOMPOSITION PRODUCTS: Including but not limited to oxides of carbon and nitrogen.

HAZARDOUS POLYMERIZATION: Does not occur.

CONDITIONS TO AVOID: Does not polymerize.

CORROSIVE TO METAL: Mild steel, brass

OXIDIZER: No

SECTION VII - PERSONAL PROTECTION

Users of a pesticidal end use product should refer to the product label for personal protective equipment requirements.

RECOMMENDATIONS FOR MANUFACTURING, COMMERCIAL BLENDING, AND PACKAGING WORKERS:**Respiratory Protection:**

Supplied air respirators should be worn if large quantities of mist/dust are generated or prolonged exposure possible.

Eye Protection:

Chemical goggles when respirator does not provide eye protection.

Protective Clothing:

Gloves and protective clothing as necessary to prevent skin contact.

Ventilation:

Whenever possible, engineering controls should be used to minimize the need for personal protective equipment.

SECTION VIII - ENVIRONMENTAL DATA**ENVIRONMENTAL TOXICITY DATA**

See the product label for information regarding environmental toxicity.

SARA 311/312 REPORTING

FIRE:N PRESSURE:N REACTIVITY:N ACUTE:Y CHRONIC:N TPQ(lbs): N/R

SPILL AND LEAK PROCEDURES:

In case of large scale spillage of this product, avoid contact, isolate area and keep out animals and unprotected persons. Call CHEMTREC (800 424-9300) or BASF Corporation (800 832-HELP). For a small spill, wear personal protective equipment as specified on the label.

FOR A LIQUID SPILL: Dike and contain the spill with inert material (sand, earth, etc.) and transfer the liquid and solid diking materials to separate containers for disposal.

FOR A SOLID SPILL: Sweep solid into a drum for re-use or disposal. Remove personal protective equipment and decontaminate it prior to re-use.

HAZARDOUS SUBSTANCE SUPERFUND: No RQ(lbs): None

WASTE DISPOSAL METHOD:

Pesticide wastes are acutely hazardous. Wastes resulting from this product may be disposed of on site or at an approved waste disposal facility. Improper disposal of excess pesticide, spray mix or rinsate is a violation of federal law. If these wastes cannot be disposed of according to label instructions, contact the state agency responsible for pesticide regulation or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

HAZARDOUS WASTE 40CFR261: No

HAZARDOUS WASTE NUMBER:None

CONTAINER DISPOSAL:

FOR PLASTIC CONTAINERS: Triple rinse (or equivalent) and add rinsate to the spray tank. Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, or by incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

FOR BULK CONTAINERS: Reusable containers should be returned to the point of purchase for cleaning and re-filling.

FOR MINIBULK CONTAINERS: Clean all tanks on an approved loading pad so rinsate can be collected and mixed into the spray solution or into a dedicated tank. Using a high pressure sprayer, rinse several times with small volumes of water to minimize rinsate.

SECTION IX - SHIPPING DATA - PACKAGE AND BULK**D.O.T. PROPER SHIPPING NAME (49CFR172.101-102):**

None

HAZARDOUS SUBSTANCE**(49CFR CERCLA LIST):**

None

RQ(lbs): None**D.O.T. HAZARD CLASSIFICATION (CFR 172.101-102):****PRIMARY**

None

SECONDARY

None

D.O.T. LABELS REQUIRED (49CFR172.101-102):

None

**D.O.T. PLACARDS
REQUIRED (CFR172.504):**

None

**POISON CONSTITUENT
(49CFR172.203(K)):**

None

BILL OF LADING DESCRIPTION

Compounds, tree or weed killing, NOIBN

This product is not regulated by the Department of Transportation (DOT). It does not meet the definition of DOT corrosive (49 CFR 173.136).

CC NO.: Not applicable**UN/NA CODE:****SECTION X - ADDITIONAL INFORMATION****Habitat® Herbicide****KEEP OUT OF REACH OF CHILDREN****CAUTION****BASF Corporation**

Agricultural Products Group

P.O.Box 13528,

Research Triangle Park, NC 27709

(919) 547-2000

DISCLAIMER

IMPORTANT: WHILE THE DESCRIPTIONS, DESIGNS, DATA AND INFORMATION CONTAINED HEREIN ARE PRESENTED IN GOOD FAITH AND BELIEVED TO BE ACCURATE, IT IS PROVIDED FOR YOUR GUIDANCE ONLY. BECAUSE MANY FACTORS MAY AFFECT PROCESSING OR APPLICATION/USE, WE RECOMMEND THAT YOU MAKE TESTS TO DETERMINE THE SUITABILITY OF A PRODUCT FOR YOUR PARTICULAR PURPOSE PRIOR TO USE. NO WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE MADE REGARDING PRODUCTS DESCRIBED OR DESIGNS, DATA OR INFORMATION SET FORTH, OR THAT THE PRODUCTS, DESIGNS, DATA OR INFORMATION MAY BE USED WITHOUT INFRINGING THE INTELLECTUAL PROPERTY RIGHTS OF OTHERS. IN NO CASE SHALL THE DESCRIPTIONS, INFORMATION, DATA OR DESIGNS PROVIDED BE CONSIDERED A PART OF OUR TERMS AND CONDITIONS OF SALE. FURTHER, YOU EXPRESSLY UNDERSTAND AND AGREE THAT THE DESCRIPTIONS, DESIGNS, DATA, AND INFORMATION FURNISHED BY BASF HEREUNDER ARE GIVEN GRATIS AND BASF ASSUMES NO OBLIGATION OR LIABILITY FOR THE DESCRIPTION, DESIGNS, DATA AND INFORMATION GIVEN OR RESULTS OBTAINED, ALL SUCH BEING GIVEN AND ACCEPTED AT YOUR RISK.

APPENDIX B

Federal Threatened and Endangered Species List

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAUFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES**

Common Name	Scientific Name	Status	Occurrence
<u>BEAUFORT COUNTY</u>			
West Indian manatee	<i>Trichechus manatus</i>	E	Known
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	Known
Wood stork	<i>Mycteria americana</i>	E	Known
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	Known
Piping plover	<i>Charadrius melodus</i>	T, CH	Known
Kemp's ridley sea turtle	<i>Lepidochelys kempii*</i>	E	Known
Leatherback sea turtle	<i>Dermochelys coriacea*</i>	E	Known
Loggerhead sea turtle	<i>Caretta caretta</i>	T	Known
Green sea turtle	<i>Chelonia mydas*</i>	T	Known
Flatwoods salamander	<i>Ambystoma cingulatum</i>	T	Known
Shortnose sturgeon	<i>Acipenser brevirostrum*</i>	E	Known
Pondberry	<i>Lindera melissifolia</i>	E	Known
Canby's dropwort	<i>Oxypolis canbyi</i>	E	Possible
Chaff-seed	<i>Schwalbea americana</i>	E	Known
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>	SC	Possible
Cupgrass	<i>Eriochloa michauxii</i>	SC	Known
Godfrey's privet	<i>Forestiera godfreyi</i>	SC	Known
Pondspice	<i>Litsea aestivalis</i>	SC	Known
Bachman's sparrow	<i>Aimophila aestivalis</i>	SC	Possible
Henslow's sparrow	<i>Ammodramus henslowii</i>	SC	Known
Red knot	<i>Calidris canutus</i>	SC	Possible
Swallow-tailed kite	<i>Elanoides forficatus forficatus</i>	SC	Known
American kestrel	<i>Falco sparverius</i>	SC	Possible
American oystercatcher	<i>Haematopus palliatus</i>	SC	Known
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	Possible
Swainson's warbler	<i>Limnothlypis swainsonii</i>	SC	Known
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	Possible
Painted bunting	<i>Passerina ciris ciris</i>	SC	Possible
Gull-billed tern	<i>Sterna nilotica</i>	SC	Known
Hilton Head white-tail deer	<i>Odocoileus virginianus hiltonensis</i>	SC	Known
Hunting Island white-tail deer	<i>Odocoileus virginianus venatoria</i>	SC	Known
Southeastern myotis	<i>Myotis austroriparius</i>	SC	Known
Southern hognose snake	<i>Heterodon simus</i>	SC	Known
<u>BERKELEY COUNTY</u>			
West Indian manatee	<i>Trichechus manatus</i>	E	Possible
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	Known
Wood stork	<i>Mycteria americana</i>	E	Known
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	Known
Loggerhead sea turtle	<i>Caretta caretta</i>	T	Known
Flatwoods salamander	<i>Ambystoma cingulatum</i>	T	Known

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES (CONT'D)**

Common Name	Scientific Name	Status	Occurrence
<u>BERKELEY COUNTY (cont'd)</u>			
Shortnose sturgeon	<i>Acipenser brevirostrum*</i>	E	Known
Pondberry	<i>Lindera melissifolia</i>	E	Known
Canby's dropwort	<i>Oxypolis canbyi</i>	E	Known
Chaff-seed	<i>Schwalbea americana</i>	E	Known
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>	SC	Possible
Gopher frog	<i>Rana capito</i>	SC	Known
Incised groovebur	<i>Agrimonia incisa</i>	SC	Known
Wagner's spleenwort	<i>Asplenium heteroresiliens</i>	SC	Known
Chapman's sedge	<i>Carex chapmanii</i>	SC	Known
Ciliate-leaf tickseed	<i>Coreopsis integrifolia</i>	SC	Known
Angiosperm (no common name)	<i>Elytraria caroliniensis</i>	SC	Known
Pondspice	<i>Litsea aestivalis</i>	SC	Known
Boykin's lobelia	<i>Lobelia boykinii</i>	SC	Known
Pineland plantain	<i>Plantago sparsiflora</i>	SC	Known
False coco	<i>Pteroglossaspis ecristata</i>	SC	Known
Awned meadowbeauty	<i>Rhexia aristosa</i>	SC	Known
Brown beaked-rush	<i>Rhynchospora pleiantha</i>	SC	Known
Sun-facing coneflower	<i>Rudbeckia heliopsisidis</i>	SC	Known
Biltmore green briar	<i>Smilax biltmoreana</i>	SC	Known
Reclined meadow-rue	<i>Thalictrum subrotundum</i>	SC	Known
Least trillium	<i>Trillium pusillum var. pusillum</i>	SC	Known
Bachman's sparrow	<i>Aimophila aestivalis</i>	SC	Possible
Henslow's sparrow	<i>Ammodramus henslowii</i>	SC	Known
Black-throated green warbler	<i>Dendroica virens</i>	SC	Possible
Swallow-tailed kite	<i>Elanoides forficatus forficatus</i>	SC	Known
American kestrel	<i>Falco sparverius</i>	SC	Possible
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	Possible
Painted bunting	<i>Passerina ciris ciris</i>	SC	Possible
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	SC	Known
Southeastern myotis	<i>Myotis austroriparius</i>	SC	Known
Southern hognose snake	<i>Heterodon simus</i>	SC	Known
<u>CHARLESTON COUNTY</u>			
West Indian manatee	<i>Trichechus manatus</i>	E	Known
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	Known
Bachman's warbler	<i>Vermivora bachmanii</i>	E	Known
Wood stork	<i>Mycteria americana</i>	E	Known
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	Known
Piping plover	<i>Charadrius melodus</i>	T, CH	Known
Kemp's ridley sea turtle	<i>Lepidochelys kempii*</i>	E	Known
Leatherback sea turtle	<i>Dermodochelys coriacea*</i>	E	Known

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES (CONT'D)**

Common Name	Scientific Name	Status	Occurrence
CHARLESTON COUNTY (cont'd)			
Loggerhead sea turtle	<i>Caretta caretta</i>	T	Known
Green sea turtle	<i>Chelonia mydas</i> *	T	Known
Flatwoods salamander	<i>Ambystoma cingulatum</i>	T	Known
Shortnose sturgeon	<i>Acipenser brevirostrum</i> *	E	Known
Sea-beach amaranth	<i>Amaranthus pumilus</i>	T	Possible
Canby's dropwort	<i>Oxypolis canbyi</i>	E	Possible
Pondberry	<i>Lindera melissifolia</i>	E	Known
Chaff-seed	<i>Schwalbea americana</i>	E	Possible
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>	SC	Known
Gopher frog	<i>Rana capito</i>	SC	Known
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	Known
Incised groovebur	<i>Agrimonia incisa</i>	SC	Known
Venus' fly-trap	<i>Dionaea muscipula</i>	SC	Known
Angiosperm (no common name)	<i>Elytraria caroliniensis</i>	SC	Known
Godfrey's privet	<i>Forestiera godfreyi</i>	SC	Known
Creeping St. John's wort	<i>Hypericum adpressum</i>	SC	Known
Pondspice	<i>Litsea aestivalis</i>	SC	Known
Boykin's lobelia	<i>Lobelia boykinii</i>	SC	Known
Sweet pinesap	<i>Monotropis odorata</i>	SC	Known
Savannah or Piedmont cowbane	<i>Oxypolis ternata</i>	SC	Known
Pineland plantain	<i>Plantago sparsiflora</i>	SC	Known
False coco	<i>Pteroglossaspis ecristata</i>	SC	Known
Awmed meadowbeauty	<i>Rhexia aristosa</i>	SC	Possible
Bachman's sparrow	<i>Aimophila aestivalis</i>	SC	Known
Henslow's sparrow	<i>Ammodramus henslowii</i>	SC	Possible
Red knot	<i>Calidris canutus</i>	SC	Possible
Black-throated green warbler	<i>Dendroica virens</i>	SC	Known
Swallow-tailed kite	<i>Elanoides forficatus forficatus</i>	SC	Possible
American kestrel	<i>Falco sparverius</i>	SC	Known
American oystercatcher	<i>Haematopus palliatus</i>	SC	Possible
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	Possible
Black rail	<i>Laterallus jamaicensis</i>	SC	Known
Swainson's warbler	<i>Limnothlypis swainsonii</i>	SC	Possible
Painted bunting	<i>Passerina ciris ciris</i>	SC	Known
Gull-billed tern	<i>Sterna nilotica</i>	SC	Known
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	SC	Known
Southeastern myotis	<i>Myotis austroriparius</i>	SC	Known
Bull's Island white-tail deer	<i>Odocoileus virginianus taurinsulae</i>	SC	Known
Southern hognose snake	<i>Heterodon simus</i>	SC	Known
Island glass lizard	<i>Ophisaurus compressus</i>	SC	Known

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES (CONT'D)**

Common Name	Scientific Name	Status	Occurrence
<u>COLLETON COUNTY</u>			
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	Known
Wood stork	<i>Mycteria americana</i>	E	Known
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	Known
Piping plover	<i>Charadrius melodus</i>	T, CH	Known
Kemp's ridley sea turtle	<i>Lepidochelys kempii*</i>	E	Known
Leatherback sea turtle	<i>Dermochelys coriacea*</i>	E	Known
Loggerhead sea turtle	<i>Caretta caretta</i>	T	Known
Green sea turtle	<i>Chelonia mydas*</i>	T	Known
Shortnose sturgeon	<i>Acipenser brevirostrum*</i>	E	Possible
Pondberry	<i>Lindera melissifolia</i>	E	Known
Canby's dropwort	<i>Oxypolis canbyi</i>	E	Possible
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>	SC	Known
Angiosperm (no common name)	<i>Elytraria caroliniensis</i>	SC	Known
Godfrey's privet	<i>Forestiera godfreyi</i>	SC	Known
Pondspice	<i>Litsea aestivalis</i>	SC	Known
Boykin's lobelia	<i>Lobelia boykinii</i>	SC	Known
Carolina bird-in-a-nest	<i>Macbridea caroliniana</i>	SC	Known
Crested fringed orchid	<i>Pteroglossaspis ecristata</i>	SC	Possible
Bachman's sparrow	<i>Aimophila aestivalis</i>	SC	Known
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	Possible
Henslow's sparrow	<i>Ammodramus henslowii</i>	SC	Possible
Red knot	<i>Calidris canutus</i>	SC	Possible
Black-throated green warbler	<i>Dendroica virens</i>	SC	Known
Swallow-tailed kite	<i>Elanoides forficatus forficatus</i>	SC	Possible
American kestrel	<i>Falco sparverius</i>	SC	Known
American oystercatcher	<i>Haematopus palliatus</i>	SC	Possible
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	Possible
Black rail	<i>Laterallus jamaicensis</i>	SC	Possible
Painted bunting	<i>Passerina ciris ciris</i>	SC	Known
Gull-billed tern	<i>Sterna nilotica</i>	SC	Known
Bluebarred pygmy sunfish	<i>Elassoma okatie</i>	SC	Possible
Southern hognose snake	<i>Heterodon simus</i>	SC	Known
Island glass lizard	<i>Ophisaurus compressus</i>	SC	Known
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	SC	Known
<u>GEORGETOWN COUNTY</u>			
West Indian manatee	<i>Trichechus manatus</i>	E	Known
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	Known
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	Known
Wood stork	<i>Mycteria americana</i>	E	Known
Piping plover	<i>Charadrius melodus</i>	T, CH	Known

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES (CONT'D)**

Common Name	Scientific Name	Status	Occurrence
GEORGETOWN COUNTY (cont'd)			
Kemp's ridley sea turtle	<i>Lepidochelys kempii*</i>	E	Known
Leatherback sea turtle	<i>Dermochelys coriacea*</i>	E	Known
Loggerhead sea turtle	<i>Caretta caretta</i>	T	Known
Green sea turtle	<i>Chelonia mydas*</i>	T	Known
Shortnose sturgeon	<i>Acipenser brevirostrum*</i>	E	Known
Sea-beach amaranth	<i>Amaranthus pumilus</i>	T	Known
Pondberry	<i>Lindera melissifolia</i>	E	Possible
Canby's dropwort	<i>Oxypolis canbyi</i>	E	Possible
Chaffseed	<i>Schwalbea americana</i>	E	Possible
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>	SC	Possible
Georgia lead-plant	<i>Amorpha georgiana var. georgiana</i>	SC	Known
One-flower balduina	<i>Balduina uniflora</i>	SC	Known
Venus' fly-trap	<i>Dionaea muscipula</i>	SC	Known
Southern bog-button	<i>Lachnocaulon beyrichianum</i>	SC	Known
Pondspice	<i>Litsea aestivalis</i>	SC	Known
Carolina bogmint	<i>Macbridea caroliniana</i>	SC	Known
Savannah or Piedmont cowbane	<i>Oxypolis ternata</i>	SC	Known
Carolina grass-of-parnassus	<i>Parnassia caroliniana</i>	SC	Known
Pineland plantain	<i>Plantago sparsiflora</i>	SC	Known
Awnead meadowbeauty	<i>Rhexia aristosa</i>	SC	Known
Wire-leaved dropseed	<i>Sporobolus teretifolius</i>	SC	Known
Reclined meadow-rue	<i>Thalictrum subrotundum</i>	SC	Known
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	Possible
Dune bluecurls	<i>Trichostema sp 1</i>	SC	Known
Bachman's sparrow	<i>Aimophia aestivalis</i>	SC	Known
Henslow's sparrow	<i>Ammodramus henslowii</i>	SC	Known
Red knot	<i>Calidris canutus</i>	SC	Possible
Black-throated green warbler	<i>Dendroica virens</i>	SC	Possible
Swallow-tailed kite	<i>Elanoides forficatus forficatus</i>	SC	Known
American kestrel	<i>Falco sparverius</i>	SC	Possible
American oystercatcher	<i>Haematopus palliatus</i>	SC	Known
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	Possible
Black rail	<i>Laterallus jamaicensis</i>	SC	Possible
Swainson's warbler	<i>Limnothlypis swainsonii</i>	SC	Known
Painted bunting	<i>Passerina ciris ciris</i>	SC	Possible
Gull-billed tern	<i>Sterna nilotica</i>	SC	Known
Carolina pygmy sunfish	<i>Elassoma boehlkei</i>	SC	Known
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	SC	Known
Southern hognose snake	<i>Heterodon simus</i>	SC	Possible
Pine or Gopher snake	<i>Pituophis melanoleucus melanoleucus</i>	SC	Known

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES (CONT'D)**

Common Name	Scientific Name	Status	Occurrence
<u>HORRY COUNTY</u>			
West Indian manatee	<i>Trichechus manatus</i>	E	Known
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	Known
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	Known
Wood stork	<i>Mycteria americana</i>	E	Known
Piping plover	<i>Charadrius melodus</i>	T, CH	Known
Kemp's ridley sea turtle	<i>Lepidochelys kempii*</i>	E	Known
Leatherback sea turtle	<i>Dermochelys coriacea*</i>	E	Known
Loggerhead sea turtle	<i>Caretta caretta</i>	T	Known
Green sea turtle	<i>Chelonia mydas*</i>	T	Possible
Shortnose sturgeon	<i>Acipenser brevirostrum*</i>	E	Known
Sea-beach amaranth	<i>Amaranthus pumilus</i>	T	Known
Pondberry	<i>Lindera melissifolia</i>	E	Possible
Canby's dropwort	<i>Oxypolis canbyi</i>	E	Possible
Chaff-seed	<i>Schwalbea americana</i>	E	Known
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>	SC	Possible
Georgia lead-plant	<i>Amorpha georgiana var. georgiana</i>	SC	Known
One-flower balduina	<i>Balduina uniflora</i>	SC	Known
Ciliate-leaf tickseed	<i>Coreopsis integrifolia</i>	SC	Known
Venus' fly-trap	<i>Dionaea muscipula</i>	SC	Known
Dwarf burhead	<i>Echinodorus parvalus</i>	SC	Known
Harper's fimbriistylis	<i>Fimbriistylis perpusilla</i>	SC	Known
Southern bog-button	<i>Lachnocaulon beyrichianum</i>	SC	Known
Pondspice	<i>Litsea astivalis</i>	SC	Known
Carolina bogmint	<i>Macbridea caroliniana</i>	SC	Known
Piedmont cowbane	<i>Oxypolis ternata</i>	SC	Known
Carolina grass-of parnassus	<i>Parnassia caroliniana</i>	SC	Known
Pineland plantain	<i>Plantago sparsiflora</i>	SC	Known
Crested fringed orchid	<i>Pteroglossaspis ecristata</i>	SC	Known
Well's Pyxie Moss	<i>Pyxidantha barbulata var. barbulata</i>	SC	Known
Wire-leaved dropseed	<i>Sporobolus teretifolius</i>	SC	Known
Pickering's morning-glory	<i>Stylisma pickeringii var. pickeringii</i>	SC	Known
White false-asphodel	<i>Tofieldia glabra</i>	SC	Known
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	Possible
Bachman's sparrow	<i>Aimophia aestivalis</i>	SC	Known
Henslow's sparrow	<i>Ammodramus henslowii</i>	SC	Known
Red knot	<i>Calidris canutus</i>	SC	Possible
Swallow-tailed kite	<i>Elanoides forficatus forficatus</i>	SC	Known
American kestrel	<i>Falco sparverius</i>	SC	Possible
American oystercatcher	<i>Haematopus palliatus</i>	SC	Known
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	Possible

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES (CONT'D)**

Common Name	Scientific Name	Status	Occurrence
<u>HORRY COUNTY (cont'd)</u>			
Painted bunting	<i>Passerina ciris ciris</i>	SC	Possible
Gull-billed tern	<i>Sterna nilotica</i>	SC	Known
Southern hognose snake	<i>Heterodon simus</i>	SC	Possible
Northern pine snake	<i>Pituophis melanoleucus melanoleucus</i>	SC	Known
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	SC	Known
<u>JASPER COUNTY</u>			
West Indian manatee	<i>Trichechus manatus</i>	E	Known
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	Known
Red-cockaded woodpecker	<i>Picoides borealis</i>	E	Known
Wood stork	<i>Mycteria americana</i>	E	Known
Piping plover	<i>Charadrius melodus</i>	T, CH	Possible
Eastern indigo snake	<i>Drymarchon corais couperi</i>	T	Possible
Kemp's ridley sea turtle	<i>Lepidochelys kempii*</i>	E	Known
Leatherback sea turtle	<i>Dermochelys coriacea*</i>	E	Known
Loggerhead sea turtle	<i>Caretta caretta</i>	T	Known
Green sea turtle	<i>Chelonia mydas*</i>	T	Possible
Flatwoods salamander	<i>Ambystoma cingulatum</i>	T	Known
Shortnose sturgeon	<i>Acipenser brevirostrum*</i>	E	Known
Pondberry	<i>Lindera melissifolia</i>	E	Possible
Canby's dropwort	<i>Oxypolis canbyi</i>	E	Possible
Chaff-seed	<i>Schwalbea americana</i>	E	Known
Southern Dusky Salamander	<i>Desmognathus auriculatus</i>	SC	Possible
Creeping St. Johns-wort	<i>Hypericum adpressum</i>	SC	Known
Pondspice	<i>Litsea aestivalis</i>	SC	Known
Pineland plantain	<i>Plantago sparsiflora</i>	SC	Known
Crested fringed orchid	<i>Pteroglossaspis ecristata</i>	SC	Known
Bachman's sparrow	<i>Aimophia aestivalis</i>	SC	Known
Henslow's sparrow	<i>Ammodramus henslowii</i>	SC	Known
Red knot	<i>Calidris canutus</i>	SC	Possible
Swallow-tailed kite	<i>Elanoides forficatus forficatus</i>	SC	Known
American kestrel	<i>Falco sparverius</i>	SC	Possible
American oystercatcher	<i>Haematopus palliatus</i>	SC	Known
Loggerhead shrike	<i>Lanius ludovicianus</i>	SC	Possible
Kirtland's Warbler	<i>Dendroica kirtlandii</i>	E	Possible
Painted bunting	<i>Passerina ciris ciris</i>	SC	Possible
Gull-billed tern	<i>Sterna nilotica</i>	SC	Known
Yellow lampmussel	<i>Lampsilis cariosa</i>	SC	Known
Bluebarred pygmy sunfish	<i>Elassoma okatie</i>	SC	Known
Tortoise, gopher (eastern pops)	<i>Gopherus polyphemus</i>	SC	Known

**USF&WS THREATENED AND ENDANGERED SPECIES
IN BEAFORT, BERKELY, CHARLESTON, COLLETON,
GEORGETOWN, HORRY, AND JASPER COUNTIES (CONT'D)**

Common Name	Scientific Name	Status	Occurrence
<u>JASPER COUNTY (cont'd)</u>			
Southern hognose snake	<i>Heterodon simus</i>	SC	Possible
Mimic glass lizard	<i>Ophisaurus mimicus</i>	SC	Known
Northern pine snake	<i>Pituophis melanoleucus melanoleucus</i>	SC	Known
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	SC	Known
Rafinesque's big-eared bat	<i>Corynorhinus rafinesquii</i>	SC	Known

E: Federally endangered T: Federally threatened CH: Critical Habitat

SC: Federal Species of Concern. These species are rare or limited in distribution but are not currently legally protected under the Endangered Species Act.

Species proposed for listing: None

* Contact NOAA Fisheries for more information on this species.

APPENDIX C

Manufacturer's Information for Habitat[®] Herbicide

Habitat[®]

herbicide

Applications may only be made for the control of undesirable emergent and floating aquatic vegetation in and around standing and flowing water, including estuarine and marine sites. Applications may be made to control undesirable wetland, riparian and terrestrial vegetation growing in or around surface water when applications may result in inadvertent applications to surface water.

Active ingredient:

Isopropylamine salt of Imazapyr (2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid)*28.7%

Inert ingredients..... 71.3%

Total100.0%

* Equivalent to 22.6% 2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid or 2 pounds acid per gallon.

EPA Reg. No. 241-426

U.S. Patent No. 4,798,619

EPA Est. No.

KEEP OUT OF REACH OF CHILDREN.

CAUTION/PRECAUCIÓN

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
(If you do not understand the label, find someone to explain it to you in detail.)

**In case of an emergency endangering life or property involving this product, call day or night,
800-832-HELP.**

See Next Page for Additional Precautionary Statements

Net contents: _____

For more information, please visit our web site:

www.vmanswers.com

BASF Corporation
Agricultural Products
26 Davis Drive
Research Triangle Park, NC 27709

 **BASF**
The Chemical Company

FIRST AID	
If on skin or clothing	<ul style="list-style-type: none"> • Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
If in eyes	<ul style="list-style-type: none"> • Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice.
If inhaled	<ul style="list-style-type: none"> • Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth, if possible. • Call a poison control center or doctor for further treatment advice.
HOT LINE NUMBER	
Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact BASF Corporation for emergency medical treatment information: 1-800-832-HELP (4357).	

PRECAUTIONARY STATEMENTS

HAZARD TO HUMANS

CAUTION!

Avoid contact with skin, eyes or clothing. Avoid breathing spray mist. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT (PPE):

Some materials that are chemical-resistant to this product are listed below. If you want more options, follow the instructions for category A on an EPA chemical-resistant category selection chart.

Applicators and other handlers must wear:

- Long-sleeve shirt and long pants
- Chemical-resistant gloves, Category A
- shoes plus socks

Follow manufacturer's instructions for cleaning and maintaining PPE. If no such instructions are given for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

PHYSICAL AND CHEMICAL HAZARDS

Spray solutions of **HABITAT® herbicide** should be mixed, stored and applied only in stainless steel, fiberglass, plastic and plastic-lined steel containers.

DO NOT mix, store or apply **HABITAT** or spray solutions of **HABITAT** in unlined steel (except stainless steel) containers or spray tanks.

ENVIRONMENTAL HAZARDS

DO NOT apply to water except as specified in this label. Treatment of aquatic weeds may result in oxygen depletion or loss due to decomposition of dead plants. This oxygen loss may cause the suffocation of some aquatic organisms. Do not treat more than one half of the surface area of the water in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outward in bands to allow aquatic organisms to move into untreated areas. Do not contaminate water when disposing of equipment washwaters or rinsate.

This pesticide is toxic to vascular plants and should be used strictly in accordance with the drift precautions on the label.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

HABITAT should be used only in accordance with recommendations on the leaflet label attached to the container. Keep containers closed to avoid spills and contamination.

STORAGE AND DISPOSAL

DO NOT contaminate water, food or feed by storage or disposal.

PESTICIDE STORAGE: DO NOT store below 10° F.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in an approved sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning. If burned, stay out of smoke.

IMPORTANT

DO NOT use on food crops. **DO NOT** apply this product within one-half mile upstream of an active potable water intake in flowing water (i.e., river, stream, etc.) or within one-half mile of an active potable water intake in a standing body of water, such as a lake, pond or reservoir. **DO NOT** apply to water used for irrigation except as described in **APPLICATION TO WATERS USED FOR IRRIGATION** section of this label. Keep from contact with fertilizers, insecticides, fungicides and seeds. **DO NOT** drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the treated soil may be washed or moved into contact with their roots. **DO NOT** use on lawns, walks, driveways, tennis courts, or similar areas. **DO NOT** side trim desirable vegetation with this product unless severe injury and plant death can be tolerated. Prevent drift of spray to desirable plants.

Clean application equipment after using this product by thoroughly flushing with water.

GENERAL USE PRECAUTIONS AND RESTRICTIONS

Applications may only be made for the control of undesirable emergent and floating aquatic vegetation in and around standing and flowing water, including estuarine and marine sites. Applications may be made to control undesirable wetland, riparian and terrestrial vegetation growing in or around surface water when applications may result in inadvertent applications to surface water.

Do not apply more than 6 pints of product (1.5 lbs. acid equivalent) per acre per year.

Aerial application is restricted to helicopter only.

Application of **HABITAT® herbicide** can only be made by federal or state agencies, such as Water Management District personnel, municipal officials and the U.S. Army Corps of Engineers, or those applicators who are licensed or certified

as aquatic pest control applicators and are authorized by the state or local government.

Treatment to other than non-native invasive species is limited to only those plants that have been determined to be a nuisance by a federal or state government entity.

Applications to private waters: Applications may be made to private waters that are still, such as ponds, lakes and drainage ditches where there is minimal or no outflow to public waters.

Application to public waters: Applications may be made to public waters such as ponds, lakes, reservoirs, marshes, bayous, drainage ditches, canals, streams, rivers, and other slow-moving or quiescent bodies of water for control of aquatic weeds or for control of riparian and wetland weed species.

Consult local state fish and game agency and water control authorities before applying this product to public water. Permits may be required to treat such water.

Recreational Use of Water in Treatment Area: There are no restrictions on the use of water in the treatment area for recreational purposes, including swimming and fishing.

Livestock Use of Water in/from Treatment Area: There are no restrictions on livestock consumption of water from the treatment area.

Precautions for Potable Water Intakes: Do not apply **HABITAT** directly to water within one-half mile upstream of an active potable water intake in flowing water (i.e., river, stream, etc.) or within one-half mile of an active potable water intake in a standing body of water such as lake, pond or reservoir. To make aquatic applications around and within one-half mile of active potable water intakes, the water intake must be turned off during application and for a minimum of 48 hours after the application. These aquatic applications may be made only in the cases where there are alternative water sources or holding ponds, which would permit the turning off of an active potable water intake for a minimum period of 48 hours after the applications. Note: Existing potable water intakes which are no longer in use, such as those replaced by connections to wells or a municipal water system, are not considered to be active potable water intakes. This restriction does not apply to intermittent, inadvertent overspray of water in terrestrial use sites.

APPLICATION TO WATERS USED FOR IRRIGATION

Water treated with **HABITAT** may not be used for irrigation purposes for 120 days after application or until **HABITAT** residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Seasonal Irrigation Waters: **HABITAT** may be applied during the off-season to surface waters that are used for irrigation on a seasonable basis, provided that there is a minimum of 120 days between **HABITAT** application and the first use of treated water for irrigation purposes or until **HABITAT** residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Irrigation Canals/Ditches: DO NOT apply **HABITAT** to irrigation canals/ditches unless the 120-day restriction on irrigation water usage can be observed or **HABITAT** residue levels are determined by laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less. DO NOT apply **HABITAT** to dry irrigation canals/ditches.

Quiescent or Slow Moving Waters: In lakes and reservoirs DO NOT apply **HABITAT** within one (1) mile of an active irrigation water intake during the irrigation season. Applications less than one (1) mile from an inactive irrigation water intake may be made during the off-season, provided that the irrigation intake will remain inactive for a minimum 120 days after application or until **HABITAT** residue levels are determined by

laboratory analysis, or other appropriate means of analysis, to be 1.0 ppb or less.

Moving water: DO NOT apply within one-half mile downstream of an active irrigation water intake. When making applications upstream from an active irrigation water intake, the intake must be turned off for a period of time sufficient to allow the upstream portion of treated water to completely flow past the irrigation intake before use can resume. Shut off time will be determined by the speed of water flow and the distance and length of water treated upstream from the intake. Consult local, state and/or federal authorities before making any applications upstream from an active irrigation water intake.

GENERAL INFORMATION

Use Sites: **HABITAT**® herbicide is an aqueous solution to be mixed with water and a surfactant and applied as a spray solution to control floating and emergent undesirable vegetation (see **AQUATIC WEEDS CONTROLLED** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT** section) in or near bodies of water which may be flowing, non-flowing, or transient. **HABITAT** may be applied to aquatic sites that include lakes, rivers, streams, ponds, seeps, drainage ditches, canals, reservoirs, swamps, bogs, marshes, estuaries, bays, brackish water, transitional areas between terrestrial and aquatic sites and seasonal wet areas. See **AQUATIC USE** section of this label for precautions, restrictions, and instructions on aquatic uses.

Read and observe the following directions if aquatic sites are present in terrestrial noncrop areas and are part of the intended treatment area:

Herbicidal Activity: **HABITAT**® herbicide will control most annual and perennial grasses and broadleaf weeds in addition to many brush and vine species with some residual control of undesirable species that germinate above the waterline. **HABITAT** is readily absorbed through emergent leaves and stems and is translocated rapidly throughout the plant, with accumulation in the meristematic regions. Treated plants stop growing soon after spray application. Chlorosis appears first in the newest leaves, and necrosis spreads from this point. In perennials, the herbicide is translocated into, and kills, underground or submerged storage organs, which prevents regrowth. Chlorosis and tissue necrosis may not be apparent in some plant species until two or more weeks after application. Complete kill of plants may not occur for several weeks. Applications of **HABITAT** are rainfast one hour after treatment.

HABITAT does not control plants which are completely submerged or have a majority of their foliage under water.

Application Methods: **HABITAT** must be applied to the emergent foliage of the target vegetation and has little to no activity on submerged aquatic vegetation. **HABITAT** concentrations resulting from direct application to water are not expected to be of sufficient concentration or duration to provide control of target vegetation. Application should be made in such a way as to maximize spray interception by the target vegetation while minimizing the amount of overspray that enters the water. For maximum activity, weeds should be growing vigorously at the time of application and the spray solution should include a surfactant (See **ADJUVANTS** section for specific recommendations). **HABITAT** may be selectively applied by using low-volume directed application techniques or may be broadcast-applied by using ground equipment, watercraft or by helicopter. In addition, **HABITAT** may also be used for cut stump, cut stem and frill and girdle treatments within aquatic sites (see **AERIAL APPLICATIONS** and **GROUND APPLICATIONS** sections for additional details).

HABITAT should be applied with surface or helicopter application equipment in a minimum of 5 gallons of water per acre. When applying by helicopter, follow directions under the **AERIAL**

APPLICATIONS section of this label, otherwise refer to section on **GROUND APPLICATIONS** when using surface equipment.

Applications made to moving bodies of water should be made while traveling upstream to prevent concentration of this herbicide in water. DO NOT apply to bodies of water or portions of bodies of water where emergent and/or floating weeds do not exist.

When application is to be made to target vegetation that covers a large percentage of the surface area of impounded water, treating the area in strips may avoid oxygen depletion due to decaying vegetation. Oxygen depletion may result in the suffocation of some sensitive aquatic organisms. Do not treat more than one half of the surface area of the water in a single operation and wait at least 10 to 14 days between treatments. Begin treatment along the shore and proceed outward in bands to allow aquatic organisms to move into untreated areas.

Avoid wash-off of sprayed foliage by spray boat or recreational boat backwash for one hour after application.

Apply **HABITAT** at 2 to 6 pints per acre depending on species present and weed density. DO NOT exceed the maximum label rate of 6 pints per acre (1.5 lb ai/A) per year. Use the higher labeled rates for heavy weed pressure. Consult the **AQUATIC WEEDS CONTROLLED** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT HERBICIDE** section of this label for specific rates.

HABITAT[®] herbicide may be applied as a draw down treatment in areas described above. Apply **HABITAT** to weeds after water has been drained and allow 14 days before reintroduction of water.

PRECAUTIONS FOR AVOIDING INJURY TO NON-TARGET PLANTS

Untreated desirable plants can be affected by root uptake of **HABITAT** from treated soil. Injury or loss of desirable plants may result if **HABITAT** is applied on or near desirable plants, on areas where their roots extend, or in locations where the treated soil may be washed or moved into contact with their roots. When making applications along shorelines where desirable plants may be present, caution should be exercised to avoid spray contact with their foliage or spray application to the soil in which they are rooted. Shoreline plants that have roots that extend into the water in an area where **HABITAT** has been applied generally will not be adversely affected by uptake of the herbicide from the water.

If treated vegetation is to be removed from the application site, DO NOT use the vegetative matter as mulch or compost on or around desirable species.

MANAGING OFF-TARGET MOVEMENT

Spray Drift: Avoiding spray drift at the application site is the responsibility of the applicator. The interaction of many equipment- and weather-related factors determines the potential for spray drift. The applicator and the entity authorizing spraying are responsible for considering all these factors when making decisions.

Spray drift from applying this product may result in damage to sensitive plants adjacent to the treatment area. Only apply this product when the potential for drift to these and other adjacent sensitive areas (e.g. residential areas, bodies of water, known habitat for threatened or endangered species, or non-target crops) is minimal. Do not apply when the following conditions exist that increase the likelihood of spray drift from intended targets: high or gusty winds, high temperatures, low humidity, temperature inversions.

To minimize spray drift, the applicator should be familiar with and take into account the following drift reduction advisory information. Additional information may be available from state enforcement

agencies or the Cooperative Extension on the application of this product.

The best drift management strategy and most effective way to reduce drift potential are to apply large droplets that provide sufficient coverage and control. Applying larger droplets reduces drift potential, but will not prevent drift if applications are made improperly, or under unfavorable environmental conditions (see **WIND, TEMPERATURE AND HUMIDITY, and TEMPERATURE INVERSIONS**).

CONTROLLING DROPLET SIZE

- Volume - Use high flow rate nozzles to apply the highest practical spray volume. Nozzles with higher rated flows produce larger droplets.
- Pressure - Do not exceed the nozzle manufacturer's recommended pressures. For many nozzle types, lower pressure produces larger droplets. When higher flow rates are needed, use higher flow rate nozzles instead of increasing pressure.
- Number of Nozzles - Use the minimum number of nozzles that provide uniform coverage.
- Nozzle Orientation - Orienting nozzles so that the spray is released parallel to the airstream produces larger droplets than other orientations and is recommended practice. Significant deflection from the horizontal will reduce droplet size and increase drift potential.
- Nozzle Type - Use a nozzle type that is designed for the intended application. With most nozzle types, narrower spray angles produce larger droplets. Consider using low-drift nozzles. Solid stream nozzles oriented straight back produce the largest droplets and the lowest drift. Do not use nozzles producing a mist droplet spray.

APPLICATION HEIGHT

Making applications at the lowest possible height (helicopter, ground driven spray boom) that is safe and practical reduces exposure of droplets to evaporation and wind.

SWATH ADJUSTMENT

When applications are made with a crosswind, the swath will be displaced downwind. Therefore, on the up and downwind edges of the treatment area, the applicator must compensate for this displacement by adjusting the path of the application equipment (e.g. aircraft, ground) upwind. Swath adjustment distance should increase with increasing drift potential (higher wind, smaller droplets, etc.).

WIND

Drift potential is lowest between wind speeds of 3-10 mph. However, many factors, including droplet size and equipment type, determine drift potential at any given speed. Application should be avoided below 3 mph due to variable wind direction and high inversion potential. NOTE: Local terrain can influence wind patterns. Every applicator should be familiar with local wind patterns and how they affect spray drift.

TEMPERATURE AND HUMIDITY

When making applications in low relative humidity, set up equipment to produce larger droplets to compensate for evaporation. Droplet evaporation is most severe when conditions are both hot and dry.

TEMPERATURE INVERSIONS

Drift potential is high during a temperature inversion. Temperature inversions restrict vertical air mixing, which causes small suspended droplets to remain in a concentrated cloud, which can move in unpredictable directions due to the light variable winds common during inversions. Temperature inversions are characterized by increasing temperatures with altitude and are common on nights with limited cloud cover and light to no wind. They begin to form as the sun sets and often continue into the

morning. Their presence can be indicated by ground fog; however, if fog is not present, inversions can also be identified by the movement of smoke from a ground source or an aircraft smoke generator. Smoke that layers and moves laterally in a concentrated cloud (under low wind conditions) indicates an inversion, while smoke that moves upward and rapidly dissipates indicates good vertical air mixing.

WIND EROSION

Avoid treating powdery dry or light sandy soils when conditions are favorable for wind erosion. Under these conditions, the soil surface should first be settled by rainfall or irrigation.

AERIAL APPLICATION METHODS AND EQUIPMENT HELICOPTERS ONLY

Water Volume: Use 2 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

Managing spray drift from aerial applications: Applicators must follow these requirements to avoid off-target drift movement: 1) boom length - the distance of the outermost nozzles on the boom must not exceed $\frac{3}{4}$ the length of the rotor, 2) nozzle orientation - nozzles must always point backward parallel with the air stream and never be pointed downwards more than 45 degrees, and 3) application height - without compromising helicopter safety, applications should be made at a height of 10 feet or less above the crop canopy or tallest plants. Applicators must follow the most restrictive use cautions to avoid drift hazards, including those found in this labeling as well as applicable state and local regulations and ordinances.

GROUND APPLICATION (BROADCAST)

Water Volume: Use 5 or more gallons of water per acre. The actual minimum spray volume per acre is determined by the spray equipment used. Use adequate spray volume to provide accurate and uniform distribution of spray particles over the treated area and to avoid spray drift.

ADJUVANTS

Postemergence applications of **HABITAT® herbicide** require the addition of a spray adjuvant. Only spray adjuvants that are approved or appropriate for aquatic use should be utilized.

Nonionic Surfactants: Use a nonionic surfactant at the rate 0.25% v/v or higher (see manufacturer's label) of the spray solution (0.25% v/v is equivalent to 1 quart in 100 gallons). For best results, select a nonionic surfactant with a HLB (hydrophilic to lipophilic balance) ratio between 12 and 17 with at least 70% surfactant in the formulated product (alcohols, fatty acids, oils, ethylene glycol or diethylene glycol should not be considered as surfactants to meet the above requirements).

Methylated Seed Oils or Vegetable Oil Concentrates: Instead of a surfactant, a methylated seed oil or vegetable-based seed oil concentrate may be used at the rate of 1.5 to 2 pints per acre. When using spray volumes greater than 30 gallons per acre, methylated seed oil or vegetable based seed oil concentrates should be mixed at a rate of 1% of the total spray volume, or alternatively use a nonionic surfactant as described above. Research indicates that these oils may aid in **HABITAT** deposition and uptake by plants under moisture or temperature stress.

Silicone Based Surfactants: See manufacturer's label for specific rate recommendations. Silicone-based surfactants may reduce the surface tension of the spray droplet, allowing greater spreading on the leaf surface as compared to conventional nonionic surfactants. However, some silicone-based surfactants may dry too quickly, limiting herbicide uptake.

Invert emulsions: **HABITAT** can be applied as an invert emulsion. The spray solution results in an invert (water-in-oil)

spray emulsion designed to minimize spray drift and spray runoff, resulting in more herbicide on the target foliage. The spray emulsion may be formed in a single tank (batch mixing) or injected (in-line mixing). Consult the invert chemical label for proper mixing directions.

Other: An antifoaming agent, spray pattern indicator or drift reducing agent may be applied at the product labeled rate if necessary or desired.

TANK MIXES

HABITAT may be tank-mixed with other aquatic use herbicides for the control of emergent and floating aquatic vegetation.

Consult manufacturer's labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank-mixes.

AERIAL APPLICATIONS

All precautions should be taken to minimize or eliminate spray drift. Helicopters can be used to apply **HABITAT**; however, DO NOT make applications by helicopter unless appropriate buffer zones can be maintained to prevent spray drift out of the target area, or when spray drift as a result of helicopter application can be tolerated. Aerial equipment designed to minimize spray drift, such as a helicopter equipped with a Microfoil™ boom, Thru-Valve™ boom or raindrop nozzles, must be used and calibrated. Except when applying with a Microfoil boom, a drift control agent may be added at the recommended label rate. To avoid drift, applications should not be made during inversion conditions, when winds are gusty, or any other conditions which allow drift. Side trimming is not recommended with **HABITAT** unless death of treated tree can be tolerated.

Uniformly apply the recommended amount of **HABITAT** in 5 to 30 gallons of water per acre; include in the spray solution a nonionic surfactant or methylated seed oil or manufacturer's label rate of a silicone-based surfactant (See the **Adjuvants** section of this label for specific recommendations). A foam reducing agent may be added at the recommended label rate, if needed.

IMPORTANT: Thoroughly clean application equipment, including landing gear, immediately after use of this product. Prolonged exposure of this product to uncoated steel (except stainless steel) surfaces may result in corrosion and failure of the exposed part. The maintenance of an organic coating (paint) may prevent corrosion.

GROUND APPLICATIONS

FOLIAR APPLICATIONS

Low Volume Foliar:

Use equipment calibrated to deliver 5 to 20 gallons of spray solution per acre. To prepare the spray solution, thoroughly mix in water 0.5 to 5% **HABITAT** plus surfactant (see the **ADJUVANTS** section of this label for specific recommendations). A foam reducing agent may be applied at the recommended label rate, if needed. For control of difficult species (see **AQUATIC WEEDS CONTROLLED** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT** section for relative susceptibility of weed species), use the higher concentrations of herbicide and/or spray volumes but do not apply more than 6 pints of **HABITAT** per acre. Excessive wetting of foliage is not recommended. See the **MIXING GUIDE** below for some suggested volumes of **HABITAT** and water.

For low volume, select proper nozzles to avoid over-application. Proper application is critical to ensure desirable results. Best results are achieved when the spray covers the crown and approximately 70 percent of the plant. The use of an even flat fan tip with a spray angle of 40 degrees or less will aid in proper deposition.

Recommended tip sizes include 4004E, or 1504E. For a straight stream and cone pattern, adjustable cone nozzles such as 5500 X3 or 5500 X4 may be used. Attaching a rollover valve onto a Spraying Systems Model 30 gunjet or other similar spray guns allows for the use of both a flat fan and cone tips on the same gun.

Moisten, but do not drench target vegetation causing spray solution to run off.

Low Volume Foliar with Backpacks:

For low-growing species, spray down on the crown, covering crown and penetrating approximately 70% of the plant.

For target species 4 to 8 feet tall, swipe the sides of target vegetation by directing spray to at least two sides of the plant in smooth vertical motions from the crown to the bottom. Make sure to cover the crown whenever possible.

For target species over 8 feet tall, lace sides of the target vegetation by directing spray to at least two sides of the target in smooth zigzag motions from crown to bottom.

Low Volume Foliar with Hydraulic Handgun Application Equipment:

Use same technique as described above for **Low Volume with Backpacks**.

For broadcast applications, simulate a gentle rain near the top of target vegetation, allowing spray to contact the crown and penetrate the target foliage without falling to the understory. Herbicide spray solution which contacts the understory may result in severe injury or death of plants in the understory.

SPRAY SOLUTION MIXING GUIDE FOR LOW-VOLUME FOLIAR APPLICATIONS

AMOUNT OF SPRAY SOLUTION BEING PREPARED	DESIRED CONCENTRATION (fluid volume)				
	0.5%	0.75%	1%	1.5%	5%
	(amount of HABITAT to use)				
1 gallon	0.6 oz.	0.9 oz.	1.3 oz.	1.9 oz.	6.5 oz.
3 gallons	1.9 oz.	2.8 oz.	3.8 oz.	5.8 oz.	1.2 pint
4 gallons	2.5 oz.	3.8 oz.	5.1 oz.	7.7 oz.	1.6 pint
5 gallons	3.2 oz.	4.8 oz.	6.5 oz.	9.6 oz.	2 pints
50 gallons	2 pints	3 pints	4 pints	6 pints	10 quarts
100 gallons	4 pints	6 pints	8 pints	6 quarts	5 gallons

2 tablespoons = 1 fluid ounce

High Volume Foliar:

For optimum performance when spraying medium to high-density vegetation, use equipment calibrated to deliver up to 100 gallons of spray solution per acre (GPA). Spray solutions exceeding 100 GPA may result in excessive spray run-off, causing increased ground cover injury, and injury to desirable species. To prepare the spray solution, thoroughly mix **HABITAT® herbicide** in water and add a surfactant (see **ADJUVANT** section for specific recommendations and rates of surfactants). A foam-reducing agent may be added at the recommended label rate, if needed. For control of difficult species (see **AQUATIC WEEDS CONTROLLED BY HABITAT** section and the **ADDITIONAL WEEDS CONTROLLED BY HABITAT** section for relative susceptibility of weed species), use the higher concentrations of herbicide and/or spray volumes, but do not apply more than 6 pints of

HABITAT per acre. Uniformly cover the foliage of the vegetation to be controlled but do not apply to run-off. Excessive wetting of foliage is not recommended.

Side Trimming:

DO NOT side trim with **HABITAT** unless severe injury or death of the treated tree can be tolerated. **HABITAT** is readily translocated and can result in death of the entire tree.

CUT SURFACE TREATMENTS

HABITAT may be used to control undesirable woody vegetation by applying the **HABITAT** solution to the cambium area of freshly cut stump surfaces or to fresh cuts on the stem of the target woody vegetation. Applications can be made at any time of the year except during periods of heavy sap flow in the spring. Do not overapply solution causing run-off from the cut surface.

Injury may occur to desirable woody plants if the shoots extend from the same root system or their root systems are grafted to those of the treated tree.

CUT SURFACE APPLICATIONS WITH DILUTE AND CONCENTRATE SOLUTIONS:

HABITAT may be mixed as either a concentrated or dilute solution. The dilute solution may be used for applications to the cut surface of the stump or to cuts on the stem of the target woody vegetation. Concentrated solutions may be used for applications to cuts on the stem. Use of the concentrated solution permits application to fewer cuts on the stem, especially for large diameter trees. Follow the application instructions to determine proper application techniques for each type of solution.

- To prepare a dilute solution, mix 8 to 12 fluid ounces of **HABITAT** with one gallon of water. The use of a surfactant or penetrating agent may improve uptake through partially callused cambiums.
- To prepare a concentrated solution, mix 2 quarts of **HABITAT** with no more than 1 quart of water.

Cut stump treatments:

- Dilute Solution- spray or brush the solution onto the cambium area of the freshly cut stump surface. Insure that the solution thoroughly wets the entire cambium area (the wood next to the bark of the stump).

Cut stem (injection, hack & squirt) treatments:

- Dilute Solutions- Using standard injection equipment, apply 1 milliliter of solution at each injection site around the tree with no more than one-inch intervals between cut edges. Insure that the injector completely penetrates the bark at each injection site.
- Concentrate Solutions- Using standard injection equipment, apply 1 milliliter of solution at each injection site. Make at least one injection cut for every 3 inches of Diameter at Breast Height (DBH) on the target tree. For example, a 3-inch DBH tree will receive 1 injection cut and a 6-inch DBH tree will receive 2 injection cuts. On trees requiring more than one injection site place the injection cuts at approximately equal intervals around the tree.

Frill or girdle treatments:

- Using a hatchet, machete, or chainsaw, make cuts through the bark and completely around the tree to expose the cambium. The cut should angle downward extending into the cambium enough to expose at least two growth rings. Using a spray applicator or brush, apply a 25% to 100% solution of **HABITAT** into each cut until thoroughly wet. Avoid applying so much herbicide that runoff to the ground or water occurs.

AQUATIC SPECIES CONTROLLED

HABITAT® herbicide will control the following target species as specified in the BASF RECOMMENDATION section of the table. Rate recommendations are expressed in terms of product volume for broadcast applications and as a % solution for directed applications including spot treatments. **For % solution applications, DO NOT apply more than the equivalent of 3 quarts of HABITAT per acre.**

COMMON NAME	SCIENTIFIC NAME	BASF RECOMMENDATION
Floating Species		
*Duckweed	<i>Lemna minor</i>	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Duckweed, Giant	<i>Spirodela polyrriza</i>	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Frogbit	<i>Limnobium spongia</i>	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Spatterdock	<i>Nuphar luteum</i>	Apply a tank-mix of 2-4 pints/acre HABITAT + 4 to 6 pints/acre glyphosate (0.5% HABITAT + 1.5% glyphosate) in 100 GPA water for best control. Ensure 100% coverage of actively growing, emergent foliage.
*Water Hyacinth	<i>Eichhornia crassipes</i>	1-2 pints/acre (0.5% solution) applied in 100 GPA water to actively growing foliage.
*Water Lettuce	<i>Pistia stratiotes</i>	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
Emerged Species		
*Alligatorweed	<i>Alternanthera philoxeroides</i>	1 to 4 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing emergent foliage. Tank-mix with glyphosate is NOT recommended, and may reduce alligatorweed control, requiring higher HABITAT rates.
*Arrowhead, Duck-potato	<i>Sagittaria spp.</i>	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Bacopa, lemon	<i>Bacopa spp.</i>	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Parrot feather	<i>Myriophyllum aquaticum</i>	Must be foliage above water for sufficient HABITAT uptake. Apply 2 - 4 pints to actively growing emergent foliage.
*Pennywort	<i>Hydrocotyle spp.</i>	1-2 pints/acre (0.5% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Pickerelweed	<i>Pontederia cordata</i>	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Taro, wild; Dasheen; Elephant's Ear; Coco Yam	<i>Colocasia esculentum</i>	4-6 pints/acre (1.5% solution) applied in 100 GPA with a high quality 'sticker' adjuvant. Ensure good coverage of actively growing, emergent foliage.
*Water lily	<i>Nymphaea odorata</i>	2-3 pints/acre (1% solution) applied in 100 GPA water mix. Ensure 100% coverage of actively growing, emergent foliage.
*Water primrose	<i>Ludwigia uruguayensis</i>	4-6 pints/acre (1.5% solution), ensure 100% coverage of actively growing, emergent foliage. Tank-mix with glyphosate is NOT recommended and may reduce water primrose control.

* Not approved for use in California

AQUATIC SPECIES CONTROLLED (continued)

COMMON NAME	SCIENTIFIC NAME	BASF RECOMMENDATION
Terrestrial/Marginal		
*Soda Apple, aquatic; Nightshade	<i>Solanum tampicense</i>	2 pts./acre applied to foliage
*Bamboo, Japanese	<i>Phyllostachys spp.</i>	3 to 4 pints/acre applied to the foliage when plant is actively growing. Before setting seed head. More foliage will result in greater herbicide uptake, resulting in greater root kill.
Brazilian Pepper; Christmasberry	<i>Schinus terebinthifolius</i>	2 - 4 pints/acre applied to foliage
Cattail	<i>Typha spp.</i>	2-4 pints (1% solution) applied to actively growing, green foliage after full leaf elongation. Lower rates will control cattail in the north; higher rates are needed in the south.
Chinese Tallow Tree	<i>Sapium sebiferum</i>	16 to 24 oz applied to foliage
Cogon Grass	<i>Imperata cylindrica</i>	Burn foliage, till area, that fall spray 2 qt./acre HABITAT® herbicide + MSO applied to new growth.
Cordgrass, prairie	<i>Spartina spp.</i>	4-6 pints applied to actively growing foliage
*Cutgrass	<i>Zizaniopsis miliacea</i>	4-6 pints applied to actively growing foliage
*Elephant Grass; Napier Grass-	<i>Pennisetum purpureum</i>	3 pts./acre applied to actively growing foliage
*Flowering rush	<i>Butumu typla</i>	2-3 pints applied to actively growing foliage
Giant Reed, Wild Cane	<i>Arundo donax</i>	4 to 6 pints/acre applied in spring to actively growing foliage
*Golden Bamboo	<i>Phyllostachys aurea</i>	3 to 4 pints/acre applied to the foliage when plant is actively growing. Before setting seed head. More foliage will result in greater herbicide uptake, resulting in greater root kill.
Junglerice	<i>Echinochloa colonum</i>	3-4 pints applied to actively growing foliage
Knapweeds	<i>Centaurea species</i>	Russian Knapweed - 2 to 3 pints + 1 qt./acre MSO fall applied after senescence begins
Knotweed, Japanese (see Fallopia japonica)	<i>Polygonum cuspidatum</i>	3 to 4 pts./acre applied postemergence to actively growing foliage
Melaleuca; Paperbark Tree	<i>Melaleuca quinquenervia</i>	For established stands, apply 6 pints/acre HABITAT® herbicide + 6 pints/acre glyphosate + spray adjuvant. For best results use 4 qt./A methylated seed oil as an adjuvant. For ground foliar application, uniformly apply to ensure 100% coverage. For broadcast foliar control, apply aerially in a minimum of two passes at 10 gallons/acre applied cross treatment. For spot treatment use a 25% HABITAT + 25% solution of + glyphosate + 1.25% MSO in water applied as a frill or stump treatment.
*Nutgrass; Kili'p'opu	<i>Cyperus rotundus</i>	2 pints HABITAT + 1 qt./acre MSO applied early postemergence
*Nutsedge	<i>Cyperus spp.</i>	2 to 3 pints postemergence to foliage or pre-emergence incorporated, non-incorporated preemergence applications will not control.

* Not approved for use in California

AQUATIC SPECIES CONTROLLED (continued)

COMMON NAME	SCIENTIFIC NAME	BASF RECOMMENDATION
Terrestrial/Marginal (Cont.)		
Phragmites; Common Reed	<i>Phragmites australis</i>	4 to 6 pints/acre applied to actively growing, green foliage after full leaf elongation, ensure 100% coverage. If stand has a substantial amount of old stem tissue, mow or burn, allow to regrow to approximately 5' tall before treatment. Lower rates will control phragmites in the north; higher rates are needed in the south.
*Poison Hemlock	<i>Conium maculatum</i>	2 pints HABITAT® herbicide + 1 qt./acre MSO applied preemergence to early postemergence to rosette, prior to flowering
Purple Loosestrife	<i>Lythrum salicaria</i>	1 pint/acre applied to actively growing foliage
Reed canarygrass	<i>Phalaris arundinacea</i>	3 to 4 pints/acre applied to actively growing foliage
Rose, swamp	<i>Rosa palustris</i>	2 to 3 pts./acre applied to actively growing foliage
Russian-Olive	<i>Elaeagnus angustifolia</i>	2 to 4 pints/acre or a 1% solution, applied to foliage
Saltcedar; Tamarisk	<i>Tamarix species</i>	Aerial apply 2 qts. HABITAT + 0.25%v/v NIS applied to actively growing foliage during flowering. For spot spraying use 1% solution of HABITAT + 0.25%v/v NIS and spray to wet foliage. After application wait at least two years before disturbing treated saltcedar. Earlier disturbance can reduce overall control.
Smartweed	<i>Polygonum spp.</i>	2 pints/acre applied early postemergence
Sumac	<i>Rhus spp.</i>	2 to 3 pts./acre applied to foliage
Swamp Morning Glory; Water Spinach; Kangkong	<i>Ipomoea aquatica</i>	1 to 2 pints/acre HABITAT + 1 qt./acre MSO applied early postemergence
Torpedo Grass	<i>Panicum repens</i>	4 pints/acre (1 - 1.5% solution), ensure good coverage to actively growing foliage.
*White Top; Hoary Cress	<i>Cardaria draba</i>	1 to 2 pints/acre applied in spring, to foliage, during flowering.
Willow	<i>Salix spp.</i>	2 to 3 pts./acre HABITAT applied to actively growing foliage, ensure good coverage.

* Not approved for use in California

ADDITIONAL WEEDS CONTROLLED BY HABITAT HERBICIDE

In terrestrial sites, **HABITAT** will provide preemergence or postemergence control with residual control of the following target vegetation species at the rates listed. Residual control refers to control of newly germinating seedlings in both annuals and perennials. In general, annual weeds may be controlled by preemergence or postemergence applications of **HABITAT**. **For established biennials and perennials postemergence applications of HABITAT are recommended.**

The rates shown below pertain to broadcast applications and indicate the relative sensitivity of these weeds. The relative sensitivity should be referenced when preparing low volume spray solutions (see "Low Volume" section of "Ground Applications"); low volume applications may provide control of the target species with less **HABITAT** per acre than is shown for the broadcast treatments. **HABITAT** should be used only

in accordance with the recommendations on this label and the leaflet label.

The relative sensitivity of the species listed below can also be used to determine the relative risk of causing non-target plant injury if any of the below listed species are considered to be desirable within the area to be treated.

Resistant Biotypes: Naturally occurring biotypes (a plant within a given species that has a slightly different, but distinct genetic makeup from other plants of the same species) of some weeds listed on this label may not be effectively controlled. If naturally occurring resistant biotypes are present in an area, **HABITAT** should be tank-mixed or applied sequentially with an appropriate registered herbicide having a different mode of action to ensure control.

GRASSES

COMMON NAME	SPECIES	GROWTH HABIT ²
Apply 2-3 pints per acre¹		
Annual bluegrass	<i>(Poa annua)</i>	A
Broadleaf signalgrass	<i>(Brachiaria platyphylla)</i>	A
Canada bluegrass	<i>(Poa compressa)</i>	P
Downy brome	<i>(Bromus tectorum)</i>	A
Fescue	<i>(Festuca spp.)</i>	A/P
Foxtail	<i>(Setaria spp.)</i>	A
Italian ryegrass	<i>(Lolium multiflorum)</i>	A
Johnsongrass	<i>(Sorghum halepense)</i>	P
Kentucky bluegrass	<i>(Poa pratensis)</i>	P
Lovegrass	<i>(Eragrostis spp.)</i>	A/P
*Napier grass	<i>(Pennisetum purpureum)</i>	P
Orchardgrass	<i>(Dactylis glomerata)</i>	P
Paragrass	<i>(Brachiaria mutica)</i>	P
Quackgrass	<i>(Agropyron repens)</i>	P
Sandbur	<i>(Cenchrus spp.)</i>	A
Sand dropseed	<i>(Sporobolus cryptandrus)</i>	P
Smooth brome	<i>(Bromus inermis)</i>	P
Vaseygrass	<i>(Paspalum urvillei)</i>	P
Wild oats	<i>(Avena fatua)</i>	A
Witchgrass	<i>(Panicum capillare)</i>	A

Apply 3-4 pints per acre¹

Barnyardgrass	<i>(Echinochloa crus-gali)</i>	A
Beardgrass	<i>(Andropogon spp.)</i>	P
Bluegrass, Annual	<i>(Poa annua)</i>	A
*Bulrush	<i>(Scirpus validus)</i>	P
Cheat	<i>(Bromus secalinus)</i>	A
Crabgrass	<i>(Digitaria spp.)</i>	A
Crowfootgrass	<i>(Dactyloctenium aegyptium)</i>	A
Fall panicum	<i>(Panicum dichotomiflorum)</i>	A
Goosegrass	<i>(Eleusine indica)</i>	A
Itchgrass	<i>(Rottboellia exaltata)</i>	A
Lovegrass	<i>(Eragrostis spp.)</i>	A
*Maidencane	<i>(Panicum hemitomon)</i>	A
Panicum, Browntop	<i>(Panicum fasciculatum)</i>	A
Panicum, Texas	<i>(Panicum texanum)</i>	A
Prairie threeawn	<i>(Aristida oligantha)</i>	P
Sandbur, Field	<i>(Cenchrus incertus)</i>	A
Signalgrass	<i>(Brachiaria platyphylla)</i>	A
Wild barley	<i>(Hordeum spp.)</i>	A
Wooly Cupgrass	<i>(Eriochloa villosa)</i>	A

Apply 4-6 pints per acre¹

Bahiagrass	<i>(Paspalum notatum)</i>	P
Bermudagrass ³	<i>(Cynodon dactylon)</i>	P
Big bluestem	<i>(Andropogon gerardii)</i>	P
Dallisgrass	<i>(Paspalum dilatatum)</i>	P
Feathertop	<i>(Pennisetum villosum)</i>	P
Guineagrass	<i>(Panicum maximum)</i>	P
Saltgrass ³	<i>(Distichlis stricta)</i>	P
Sand dropseed	<i>(Sporobolus cryptandrus)</i>	P

GRASSES (CONT)

COMMON NAME	SPECIES	GROWTH HABIT ²
Sprangletop	<i>(Leptochloa spp.)</i>	A
Timothy	<i>(Phleum pratense)</i>	P
Wirestem muhly	<i>(Muhlenbergia frondosa)</i>	P

BROADLEAF WEEDS

COMMON NAME	SPECIES	GROWTH HABIT ²
Apply 2-3 pints per acre¹		
Burdock	<i>(Arctium spp.)</i>	B
Carpetweed	<i>(Mollugo verticillata)</i>	A
Carolina geranium	<i>(Geranium carolinianum)</i>	A
Clover	<i>(Trifolium spp.)</i>	A/P
Common chickweed	<i>(Stellaria media)</i>	A
Common ragweed	<i>(Ambrosia artemisiifolia)</i>	A
Dandelion	<i>(Taraxacum officinale)</i>	P
Dog fennel	<i>(Eupatorium capillifolium)</i>	A
Filaree	<i>(Erodium spp.)</i>	A
Fleabane	<i>(Erigeron spp.)</i>	A
Hoary vervain	<i>(Verbena stricta)</i>	P
Indian mustard	<i>(Brassica juncea)</i>	A
Kochia	<i>(Kochia scoparia)</i>	A
Lambsquarters	<i>(Chenopodium album)</i>	A
*Lespedeza	<i>(Lespedeza spp.)</i>	P
Miners lettuce	<i>(Montia perfoliata)</i>	A
Mullein	<i>(Verbascum spp.)</i>	B
Nettleleaf goosefoot	<i>(Chenopodium murale)</i>	A
Oxeye daisy	<i>(Chrysanthemum leucanthemum)</i>	P
Pepperweed	<i>(Lepidium spp.)</i>	A
Pigweed	<i>(Amaranthus spp.)</i>	A
Puncturevine	<i>(Tribulus terrestris)</i>	A
Russian thistle	<i>(Salsola kali)</i>	A
Smartweed	<i>(Polygonum spp.)</i>	A/P
Sorrell	<i>(Rumex spp.)</i>	P
Sunflower	<i>(Helianthus spp.)</i>	A
Sweet clover	<i>(Melilotus spp.)</i>	A/B
Tansymustard	<i>(Descurainia pinnata)</i>	A
Western ragweed	<i>(Ambrosia psilostachya)</i>	P
Wild carrot	<i>(Daucus carota)</i>	B
Wild lettuce	<i>(Lactuca spp.)</i>	A/B
Wild parsnip	<i>(Pastinaca sativa)</i>	B
Wild turnip	<i>(Brassica campestris)</i>	B
Woollyleaf bursage	<i>(Franseria tomentosa)</i>	P
Yellow woodsorrel	<i>(Oxalis stricta)</i>	P

Apply 3-4 pints per acre¹

Broom snakeweed ⁴	<i>(Gutierrezia sarothrae)</i>	P
Bull thistle	<i>(Cirsium vulgare)</i>	B
Burclover	<i>(Medicago spp.)</i>	A
Chickweed, Mouseear	<i>(Cerastium vulgatum)</i>	A
Clover, Hop	<i>(Trifolium procumbens)</i>	A
Cocklebur	<i>(Xanthium strumarium)</i>	A

BROADLEAF WEEDS (CONT)

COMMON NAME	SPECIES	GROWTH HABIT ²
Cudweed	(<i>Gnaphalium</i> spp.)	A
Desert Camelthorn	(<i>Alhagi pseudalhagi</i>)	P
Dock	(<i>Rumex</i> spp.)	P
Fiddleneck	(<i>Amsinckia intermedia</i>)	A
Goldenrod	(<i>Solidago</i> spp.)	P
Henbit	(<i>Lamium applexicaule</i>)	A
Knotweed, prostrate	(<i>Polygonum aviculare</i>)	A/P
Pokeweed	(<i>Phytolacca americana</i>)	P
Purslane	(<i>Portulaca</i> spp.)	A
Pusley, Florida	(<i>Richardia scabra</i>)	A
Rocket, London	(<i>Sisymbrium irio</i>)	A
Rush skeletonweed ⁴	(<i>Chondrilla juncea</i>)	B
Saltbush	(<i>Atriplex</i> spp.)	A
Shepherd's-purse	(<i>Capsella bursa-pastoris</i>)	A
Spurge, Annual	(<i>Euphorbia</i> spp.)	A
Stinging nettle ⁴	(<i>Urtica dioica</i>)	P
Velvetleaf	(<i>Abutilon theophrasti</i>)	A
Yellow starthistle	(<i>Centaurea solstitialis</i>)	A

Apply 4-6 pints per acre¹

Arrowwood	(<i>Pluchea sericea</i>)	A
Canada thistle	(<i>Cirsium arvense</i>)	P
Giant ragweed	(<i>Ambrosia trifida</i>)	A
Grey rabbitbrush	(<i>Chrysothamnus nauseosus</i>)	P
Little mallow	(<i>Malva parviflora</i>)	B
Milkweed	(<i>Asclepias</i> spp.)	P
Primrose	(<i>Oenothera kunthiana</i>)	P
Silverleaf nightshade	(<i>Solanum eleagnifolium</i>)	P
Sowthistle	(<i>Sonchus</i> spp.)	A
Texas thistle	(<i>Cirsium texanum</i>)	P

VINES AND BRAMBLES

COMMON NAME	SPECIES	GROWTH HABIT ²
Apply 1 pint per acre		
Field bindweed	(<i>Convolvulus arvensis</i>)	P
Hedge bindweed	(<i>Calystegia sepium</i>)	A
Apply 2-3 pints per acre¹		
Wild buckwheat	(<i>Polygonum convolvulus</i>)	P
Apply 3-4 pints per acre¹		
Greenbriar	(<i>Smilax</i> spp.)	P
Honeysuckle	(<i>Lonicera</i> spp.)	P
Morningglory	(<i>Ipomoea</i> spp.)	A/P
Poison ivy	(<i>Rhus radicans</i>)	P
Redvine	(<i>Brunnichia cirrhosa</i>)	P
Wild rose	(<i>Rosa</i> spp.)	P
Including:		
Multiflora rose	(<i>Rosa multiflora</i>)	P
McCartney rose	(<i>Rosa bracteata</i>)	P
Apply 4-6 pints per acre¹		
*Kudzu ³	(<i>Pueraria lobata</i>)	P
Trumpetcreeper	(<i>Campsis radicans</i>)	P
Virginia creeper	(<i>Parthenocissus quinquefolia</i>)	P
Wild grape	(<i>Vitis</i> spp.)	P

BRUSH SPECIES

COMMON NAME	SPECIES	GROWTH HABIT ²
Apply 4-6 pints per acre¹		
American beech	(<i>Fagus grandifolia</i>)	P
Ash	(<i>Fraxinus</i> spp.)	P
Bald cypress	(<i>Taxodium distichum</i>)	P
Bigleaf maple	(<i>Acer macrophyllum</i>)	P
Black locust ⁵	(<i>Robinia pseudoacacia</i>)	P
Black gum	(<i>Nyssa sylvatica</i>)	P
Box elder	(<i>Acer negundo</i>)	P
Cherry	(<i>Prunus</i> spp.)	P
Chinaberry	(<i>Melia azadarach</i>)	P
Dogwood	(<i>Cornus</i> spp.)	P
Elm ⁶	(<i>Ulmus</i> spp.)	P
Hawthorn	(<i>Crataegus</i> spp.)	P
Hickory	(<i>Carya</i> spp.)	P
Honeylocust ⁵	(<i>Gleditsia triacanthos</i>)	P
Maple	(<i>Acer</i> spp.)	P
Mulberry	(<i>Morus</i> spp.)	P
Oak	(<i>Quercus</i> spp.)	P
Persimmon	(<i>Diospyros virginiana</i>)	P
*Pine ⁵	(<i>Pinus</i> spp.)	P
Poplar	(<i>Populus</i> spp.)	P
Privet	(<i>Ligustrum vulgare</i>)	P
Red Alder	(<i>Alnus rubra</i>)	P
Red Maple	(<i>Acer rubrum</i>)	P
Russian Olive	(<i>Eleagnus angustifolia</i>)	P
Sassafras	(<i>Sassafras albidum</i>)	P
Sourwood	(<i>Oxydendrum arboreum</i>)	P
Sweetgum	(<i>Liquidambar styraciflua</i>)	P
*Water willow	(<i>Justica americana</i>)	P
Willow	(<i>Salix</i> spp.)	P
Yellow poplar	(<i>Liriodendron tulipifera</i>)	P

¹ The higher rates should be used where heavy or well-established infestations occur.

² Growth Habit - A = Annual, B = Biennial, P = Perennial

³ Use a minimum of 75 GPA - Control of established stands may require repeat applications.

⁴ For best results early postemergence applications are required.

⁵ Tank mix with glyphosate or triclopyr.

⁶ Tank-mix with with glyphosate.

* Not approved for use in California

For more information, please visit our web site

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The Chemical Company

APPENDIX D

Review Comments

The Draft EA and FONSI were issued for a 30-day review period on July 26, 2005 to the agencies, organizations, and individuals listed in the table below. Comments (see attached letters and e-mails) were received from the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, South Carolina Department of Natural Resources, Jack Whetstone (Clemson University), and Michael McShane. No other comments were received.

	<u>Resource Agencies</u>	
Mr. David Rackley National Marine Fisheries Services P.O. Box 12559 Charleston, SC 29412-9110	Mr. Ed Duncan Environmental Programs Director SC Dept. of Natural Resources PO Box 12559 Charleston, SC 29422-2559	Mr. Tim Hall-Field Supervisor US Fish and Wildlife Service 176 Croghan Spur Road, Suite 200 Charleston, SC 29407
Dr. Rodger Stroup, Director SHPO, SC Department of Archives 8301 Parklane Road Columbia, SC 29223	Mr. Quinton Epps, Manager Water Qual. Cert. & Wetlands Plan. Sec. SC Dept of Health and Env. Control 2600 Bull Street Columbia, SC 29201	Mr. Steve Snyder Office of Ocean and Coastal Resource Management SC Dept of Health and Env. Control 1362 McMillan Avenue Suite 400 Charleston, SC 29405
Dr. Gerald Miller EPA - Region IV 61 Forsyth Street Atlanta, GA 30303	Mr. Bill Eiser Office of Ocean and Coastal Resource Management SC Dept. of Health and Env. Control 1362 McMillan Avenue Suite 400 Charleston, SC 29405	
	<u>Miscellaneous</u>	
SC Wildlife Federation Suite 104 2711 Middleburg Drive Columbia, SC 29204	Honorable Henry E. Brown, Jr. Representative in Congress NationsBank Financial Center 5900 Core Avenue, Suite 401 North Charleston, SC 29406	Sierra Club SC State Chapter PO Box 2388 Columbia, SC 29202-2388
Mr. Dana Beach SC Coastal Conservation League PO Box 1765 Charleston, SC 29402	Mr. Coy Johnson Ducks Unlimited 104 Johnston Street Summerville, SC 29483	Mr. Val Nash Chief, Freshwater Fisheries SCDNR P.O. Box 167 Columbia, SC 29202

<p>Honorable Jim DeMint 112 Customs House 20 East Bay Street Charleston, SC 29401</p>	<p>US Department of Agriculture Natural Resources Conservation Service 1835 Assembly Street, Room 950 Columbia, SC 29201</p>	<p>Mr. Breck Carmichael Deputy Director for Wildlife And Freshwater Fisheries, SCDNR P.O. Box 167 Columbia, SC 29202</p>
<p>Honorable Lindsey Graham United States Senator 530 Johnnie Dodd Boulevard Suite 203 Mount Pleasant, SC 29464</p>	<p>Honorable Joe Wilson P.O. Box 7381 Columbia, SC 29202</p>	<p>SC Sea Grant Consortium 287 Meeting Street Charleston, SC 29401</p>
<p>BCD Council of Governments 1362 McMillan Avenue, Suite 100 North Charleston, SC 29405</p>	<p>Honorable J. Gresham Barrett 233 Pendleton Street, NW Aiken, SC 29801</p>	<p>SC Nature Conservancy PO Box 5475 Columbia, SC 29250</p>
<p>Honorable Bob Inglis 105 North Spring Street Suite 111 Greenville, SC 29601</p>	<p>Dr. Robert F. Van Dolah, Director Marine Resources Research Institute SC Dept. of Natural Resources PO Box 12559 Charleston, SC 29422</p>	<p>Honorable John M. Spratt Jr. 201 E. Main Street Suite 305 Rock Hill, SC 29730</p>
<p>Honorable James E. Clyburn Joseph Floyd Manor Suite 7 2106 Mt Pleasant Street Charleston, SC 29403</p>	<p>Jack Whetstone Clemson University Extension P.O. Box 956 Georgetown, SC 29442</p>	<p>Paul T. Gayes, PhD Center for Marine & Wetland Studies PO Box 1954 Conway, SC 29526</p>
<p>Dr. Dave Gordon US Fish and Wildlife Service SC Coastal Ecosystems Program 176 Croghan Spur Rd., Suite 200 Charleston, SC 29407</p>	<p>John Hensel SCDHEC/OCRM 1362 McMillan Ave., Suite 400 Charleston, South Carolina 29405</p>	<p>Cam Lay Dept. of Pesticide Regulations 511 Westinghouse Rd. Pendleton, South Carolina 29670</p>
<p>Marc Cribb PO Box 167, 1000 Assembly Columbia, South Carolina 29202</p>	<p>Jeannie Eidson 2600 Bull St. Columbia, South Carolina 29201-1708</p>	<p>John Inabinet 1 Riverwood Dr. PO Box 2946101 Moncks Corner, South Carolina 29461-2901</p>
<p>David Thompkins PO Box 13504 Columbia, South Carolina 29201</p>	<p>Stan Hutto 1205 Pendleton St., Rm 529 Columbia, South Carolina 29201</p>	<p>Miller White PO Drawer 190 Bonneau, South Carolina 29431</p>

Native American
Tribes

	<u>Native American</u> <u>Tribes</u>	
<p>Dr. Wenonah G. Haire Tribal Historic Preservation Officer Catawba Indian Nation P.O. Box 750 Rock Hill, SC 29731</p>	<p>Dr. Richard Allen Section 106 and NAGPRA Consultant Cherokee Nation P.O. 948 Tahlequah, OK 74465-0948</p>	<p>Ms. Virginia Nail, Historic Preservation Officer Chickasaw Nation Arlington at Mississippi P.O. Box 1548 Ada, OK 74821</p>
<p>Ms. Michelle Hamilton Tribal Historic Preservation Office The Eastern Band of the Cherokee Nation P.O. Box 455 Cherokee, NC 28719</p>	<p>Mr. Charles Enyart, Chief Eastern Shawnee Tribe P.O. Box 350 Seneca, MO 64865</p>	<p>Ms. Lillie Strange Jena Band of Choctaw P.O. Box 14 Jena, LA 71342</p>
<p>Ms. Delores Herrod Environmental Director Kialegee Tribal Town P.O. Box 332 Wetumka, OK 74883</p>	<p>Ms. Joyce Bear Tribal Historic Preservation Officer Muscogee (Creek) Nation P.O. Box 580 Okmulgee, OK 74447</p>	<p>Mr. Olin Williams Tribal Historic Preservation Officer Choctaw Nation of Oklahoma P.O. Drawer 1210, 16th & Locust Street Durant, OK 74702-1201</p>
<p>Mr. Robert Thrower Poarch Band of Creek Indians 5811 Jack Springs Road Atmore, AL 36502</p>	<p>Mr. Emman Spain Tribal Historic Preservation Officer Seminole Nation of Oklahoma P.O. Box 1498 Wewoka, OK 74884</p>	<p>Mr. Leo Henry, Chief Tuscarora Nation of New York 2006 Mount Hope Road Lewiston, NY 14092</p>
<p>Ms. Rebecca Hawkins Section 106 Coordinator Shawnee Tribe P.O. Box 189 Miami, OK 74355</p>	<p>Mr. Nick Smith Section 106 Coordinator Shawnee Tribe P.O. Box 189 Miami, OK 74355</p>	<p>Mr. Bryan K. McGertt, Mekko Thlopthlocco Tribal Town P.O. Box 188 Okemah, OK 74859</p>
<p>Mr. Charles Coleman Tribal Historic Preservation Officer Thlopthlocco Tribal Town Rt. 1, Box 190-A Weleetka, OK 74880</p>	<p>Mr William Steele, THPO Ah-Tah-Thi-Ki Museum Seminole Tribe of Florida HC-62, Box 21-A Clewiston, FL 33440</p>	<p>Mr. Richard Hill, Chairperson Haudenosaunee Standing Committee on Burial Rules and Regulations Tuscarora Nation 2235 Mt. Hope Road Sanborn, NY 14132</p>
<p>Ms. Karen Kaniatobe Absentee-Shawnee Tribe of Indians of Oklahoma 2025 South Gordon Cooper Drive Shawnee, OK 74801-9381</p>	<p>Mr. Ronnie Thomas, Chairman Alabama-Coushatta Tribes of Texas 571 State Park Road 56 Livingston, Texas 77351</p>	<p>Ms. Josephine Yargee Section 106 Coordinator Alabama-Quassarte Tribal Town P.O. Box 187 Wetumka, OK 74883</p>
<p>Mr. Archie Mouse Tribal Historic Preservation Officer United Keetoowah Band of Cherokee Indians P.O. Box 746 Tahlequah, OK 74464</p>		



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

AUG 16 2005

Department of the Army
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston, SC 29403-5107
ATTN: Mr. Alan Shirley

Subject: Environmental Assessment [EA] Control of *Phragmites australis* in South Carolina [July 2005]

Dear Sir:

Pursuant to Section 309 of the Clean Air Act, EPA, Region 4 has reviewed the subject document, an evaluation of the consequences of sequentially burning a total of 6,000 acres of *Phragmites* infested wetlands and then treating the various parcels with the herbicide, *Habitat*. Burning prior to application of the herbicide should increase the *Habitat's* lethality to the target species. Application of the herbicide will be conducted by various means [via helicopters, trucks, or boats] depending on the size/location of the areas to be treated. Follow-up treatments may become necessary to ensure long-term control.

The following information is provided for use in finalizing the NEPA documentation for future proposals of this nature:

Ground application of herbicides which are delivered in close proximity to the target species are more likely to produce "top to bottom" plant coverage. In our experience this protocol has proven to be the most effective means of providing lasting effects [death] and lessens the potential of collateral damage to non-target plant and animal species.

Products [in this case herbicides] are *registered* [not approved] by EPA, are used *according to label directions* [not as directed on the labels], and must always be applied by licensed/certified applicators.

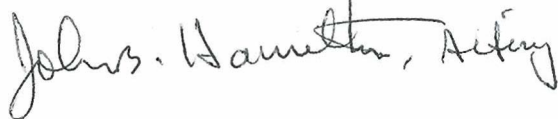
While *Habitat* is largely ineffective for control of submerged vegetation in aquatic habitats, it should have the desired effect on the terrestrial *Phragmites*.

On the basis of the information provided, we have no significant objections to the use on an EA to evaluate this proposal in lieu of the more comprehensive environmental impact statement format and by extension the forthcoming "Finding of No Significant

Impact”.

Thank you for the opportunity to comment. If we can be of further assistance, Dr. Gerald Miller (404-562-9626) will serve as initial point of contact.

Sincerely,

A handwritten signature in black ink, appearing to read "Johns. Mueller, Chief". The signature is written in a cursive style with a long horizontal line extending from the end.

Heinz J. Mueller, Chief
NEPA Program Office



United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

August 15, 2005

Mr. Joseph Jones
Chief, Planning Branch
U.S. Army Corps of Engineers
69A Hagood Avenue
Charleston, SC 29403-5107

Dear Mr. Jones:

The U.S. Fish and Wildlife Service (Service) has reviewed the Draft Environmental Assessment (DEA) and Finding of No Significant Impact for Control of *Phragmites australis* in South Carolina.

The DEA is generally adequate in its description of the existing fish and wildlife resources and the evaluation of project impacts.

We appreciate the opportunity to comment on this project.

Sincerely,

Timothy N. Hall
Field Supervisor

TNH/EME

Shirey, Alan D SAC

From: Jack Whetstone [jwhtstn@CLEMSON.EDU]
Sent: Friday, August 12, 2005 10:45 AM
To: Shirey, Alan D SAC; Steve DeKozlowski
Cc: jwhtstn@CLEMSON.EDU
Subject: Phragmites Environmental Assessment - Draft Review

Hi!

The draft looks excellent.

Here are a few paragraphs you may or may not want to add.

No one really has a good estimate of phragmites infestation in South Carolina. I believe it is higher, but how high, I don't know.

Phragmites australis is officially listed by the state of South Carolina as an illegal aquatic plant.

The US Fish and Wildlife Foundation, SC Department of Natural Resources, The Nature Conservancy, US Fish and Wildlife Service and US Department of Agriculture are presently developing a program to assist **private landowners** in the control and eradication of phragmites. With the Corps cost-sharing of phragmites control on public lands in South Carolina, a cooperative public/private partnership will be much more successful.

Protocol issues.

Burning is not always practical. You may want to add - where feasible, a fall burn

There may be populated areas with adjacent man-made structures with docks and buildings should not be burned – Unimpounded tidal areas also can not be burned.

Where burning would not be pragmatic, but herbicide control measures are still viable.

I applaud the US Army Corps of Engineers for considering cost-sharing. Phragmites is the major invasive species in brackish water areas of South Carolina.

I hope I've been of service and if I can clarify anything in this letter or assist you in any further manner with your aquatic needs, please feel free to contact me.

Sincerely,

Jack M. Whetstone
Jack M. Whetstone
Extension Aquaculture Specialist/Assoc. Professor
Clemson University
Department of Forestry and Natural Resources
SC Sea Grant Extension Program
Baruch Institute of Coastal Ecology and Forest Science
PO Box 596
Georgetown, SC 29442

9/22/2005

E-mail jwhtstn@clemson.edu

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Baruch Institute - Clemson University

Hwy 17 North

Georgetown, SC 29440

Michael G. McShane
1501 Ravens Point Road
Johns Island, South Carolina 29455
ravenspoint@msn.com

August 19, 2005

Mr. Alan Shirey
US Army Corps of Engineers
Charleston District
69A Hagood Avenue
Charleston, SC 29403

Dear Mr. Shirey,

I strongly urge the U.S. Army Corps of Engineers to approve the Draft Environmental Assessment for Control of *Phragmites australis* in South Carolina dated July 2005. I have reviewed the document and find that it represents the facts associated with embarking on addressing this problem.

I appreciate the Charleston District's recognition of the Phragmites problem in our public waterways and applaud its efforts to help address the problem through enhanced cost-sharing with appropriate agencies and parties as proposed in the Draft Environmental Assessment. Please let me know if I can provide any additional supportive comments or actions.

Sincerely

A handwritten signature in blue ink that reads "Michael G. McShane". The signature is stylized and cursive.

Michael G. McShane

South Carolina Department of Natural Resources



John E. Frampton
Director

August 19, 2005

Mr. Alan Shirey
US Army Corps of Engineers
Charleston District
69A Hagood Avenue
Charleston, SC 29403

Dear Mr. Shirey:

The South Carolina Department of Natural Resources strongly urges the U.S. Army Corps of Engineers to approve the Draft Environmental Assessment for Control of *Phragmites australis* in South Carolina dated July 2005. Our Aquatic Plant Management and Wildlife Section Staffs have reviewed this document and find it suitable and accurate.

We appreciate the Charleston District's recognition of the Phragmites problem in our public waterways and applaud its efforts to help address the problem through enhanced cost-share funds as proposed in the Draft Environmental Assessment. Our staff is ready and willing to assist in the control of this invasive and very destructive plant. Please let us know how we can cooperate further in this effort.

Sincerely,

A handwritten signature in blue ink that reads "John E. Frampton". The signature is fluid and cursive.

John E. Frampton
Director

CC: Breck Carmichael
Derrell Shipes
Steve de Kozlowski