

Integrated Mosquito and Vector
Management Program Plan

APPENDIX

H

EXCERPT FROM SAN FRANCISCO
ESTUARY INVASIVE SPARTINA
PROJECT

EXCERPT FROM

Final Programmatic Environmental Impact Statement/
Environmental Impact Report

**SAN FRANCISCO ESTUARY INVASIVE SPARTINA PROJECT:
SPARTINA CONTROL PROGRAM**

VOLUME 1:

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Environmental Impact Report

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1 mutagenicity, carcinogenicity, and teratogenicity, and found that this chemical does not elicit nega-
2 tive effects and is excreted unchanged (Washington State 1993).

3 *Project Worker Exposure Effects*

4 The potential for human health effects from the application of glyphosate depends on the potential
5 human exposure routes, and the toxicity of the herbicide and associated surfactants and impurities.
6 An exposure route describes the ways in which people can be exposed to contaminants in a par-
7 ticular area. Workers could be exposed to glyphosate and other substances if they inhale glyphosate
8 spray droplets or windblown soil particles; if they touch the liquid herbicide during mixing and
9 loading (dermal contact); or by ingesting small amounts of soil or sediment containing glyphosate
10 residues (e.g., for example, sediment clinging to hands or face). Based on the information summa-
11 rized above, it is highly unlikely that workers applying glyphosate and surfactants with hand-held
12 sprayers or from vehicles or boats would willfully inhale or ingest the quantities that would cause
13 mortality.

14 The greatest potential for worker exposure is associated with wicking or wiping activities and use
15 of injection devices. These activities are more labor-intensive than spraying and involve greater di-
16 rect contact with the herbicide. Backpack spraying is more rapid than wicking or wiping, and re-
17 duces the potential for the worker to contact the herbicide. However, some spray drift may occur
18 during spraying.

19 Application of herbicide using boats, trucks, and all-terrain vehicles (ATVs) mounted with a boom
20 sprayer or spot spraying with a hose from these vehicles may also be conducted; these methods
21 allow for more specific application than aerial spraying. Aerial spraying allows quick application to
22 a large area, but has the potential for drift and therefore inhalation of glyphosate spray droplets.

23 All herbicide application methods involve the potential for dermal (skin) contact from splashes
24 during mixing and loading. As noted above, primary health effects include eye and skin irritation.
25 In California, glyphosate ranks high among pesticides causing illness or injury to workers, who re-
26 port numerous incidents of eye and skin irritation from splashes during mixing and loading. Use of
27 personal protective equipment (PPE), including protective eyewear, as specified on the product
28 label would minimize this risk. Proper handling of glyphosate and the surfactants in accordance
29 with the labeling requirements would reduce the potential for eye and dermal irritation in workers.

30 **Mitigation HS-2: Worker Health Effects from Herbicide Application.** Appropriate health and
31 safety procedures and equipment, as described on the herbicide or surfactant label, including PPE
32 as required, shall be used by workers to minimize risks associated with chemical treatment meth-
33 ods. Only certified or licensed herbicide applicators shall mix and apply herbicide.

34 **Impact HS-3: Health Effects to the Public from Herbicide Application.** Routine application of
35 glyphosate herbicide and surfactants to treat non-native cordgrass may result in adverse health ef-
36 fects to the public, including area residents, recreational visitors, and sensitive subpopulations in-
37 cluding children and the elderly. The impact would depend on the herbicide application method,
38 the specific site location, potential receptors in the area, and the size of the area to be treated.

39 Drift of chemical spray could potentially affect residents living in close proximity to the affected
40 areas, or recreational visitors to the area. Drift from ground application can extend up to about 250
41 feet, with pesticide concentrations diminishing as the drift gets farther from the source. Drift of
42 herbicides from aerial application has been measured up to 2600 feet (approximately half a mile)
43 from the source (NCAP 2002), however concentrations are substantially diluted with distance from
44 the source. In addition, glyphosate and surfactants are only slightly toxic via the inhalation pathway

1 (Monsanto 2001 and 1998; USEPA 1993). (See information in Impact HS-1, above on the inhala-
2 tion toxicity of glyphosate.)

3 Once glyphosate is released into the environment by spraying, it can enter various environmental
4 media including air, surface water, soil, and sediments. The public could be exposed to glyphosate
5 if they contact these media. Potential exposure routes include:

- 6 • Inhalation of fine glyphosate spray droplets or windblown soil particles to which glypho-
7 sate is adsorbed
- 8 • Dermal (skin) contact with airborne glyphosate or glyphosate residues on vegetation, soil,
9 sediments, or surface water
- 10 • Incidental ingestion of glyphosate in soil or sediments by inadvertently swallowing soil or
11 sediment (e.g., by touching dirty hands to mouth or by placing dirty objects, such as toys,
12 into the mouth); this exposure route is of greatest importance for children, who tend to
13 engage in activities that can result in soil or sediment ingestion and
- 14 • Ingestion of glyphosate by eating food containing glyphosate residues, such as berries, gar-
15 den vegetables, fish, or shellfish

16 People who use treated areas for recreation could come into direct contact with vegetation that has
17 recently been sprayed, thus posing a minor risk of skin irritation. Individuals could be exposed to
18 glyphosate and surfactants while playing, walking, swimming, or fishing at or near treatment sites.
19 Glyphosate and surfactants are poorly absorbed through the skin (USEPA 1993), therefore dermal
20 contact is not likely to cause significant health effects.

21 People who consume plants or wildlife (including fish and shellfish) harvested near the spray area
22 could be exposed to glyphosate and surfactants if present in the plant or animal. However, glypho-
23 sate is minimally retained and rapidly eliminated in fish, birds, and mammals (USEPA 2001). Based
24 on these characteristics, and the water solubility and rapid degradation of glyphosate, it is not ex-
25 pected to bioconcentrate in aquatic organisms; therefore glyphosate poses minimal risk to humans
26 via consumption of aquatic organisms.

27 A quantitative human health risk assessment was conducted during preparation of the EIS for
28 noxious emergent plant management in Washington State to evaluate the potential for adverse
29 human health effects resulting from exposure to glyphosate (product name: Rodeo®, Washington
30 State 1993). In that risk assessment, conservative estimates of non-cancer and cancer toxicity were
31 compared with a conservative estimate of the amount of glyphosate to which the public could be
32 exposed. The routes of exposure evaluated included: inhalation of spray; dermal exposure from
33 vegetation and water; and ingestion of surface water, soil, sediment, wild game, fish, shellfish, gar-
34 den vegetables, and berries. Potential concentrations in the environment were estimated by as-
35 suming that no glyphosate degradation occurred. Potential human intake rates were calculated us-
36 ing reasonable maximum exposure assumptions developed by USEPA (Washington State 1993).
37 Results of the human health risk assessment indicated little potential for adverse non-cancer or
38 cancer health effects from potential exposures related to noxious vegetation treatment. Short-term
39 (acute) and long-term (chronic) cancer and non-cancer health effects for adults and children were
40 all below levels of potential concern (Washington State 1993).

41 The Washington study included several scenarios that evaluated all receptor pathways and between
42 one and six spray exposures per a receptor's lifetime. This is conservatively applicable to the Con-
43 trol Program, given the Control Program's goal of spraying each site annually for either one or two

1 years. It also assumed use of Rodeo at an application rate of 3 pounds of active ingredient per acre;
2 this is within the range of glyphosate expected to be used in the San Francisco Estuary, and be-
3 tween the highest concentrations permitted on the label (5.1 pounds/acre) and the mean applica-
4 tion rate (2.7 pounds/acre). As noted in the Washington State study, “the over- or underestimation
5 [of active ingredient in spray applications] is expected to be normal, because the differences in ex-
6 posure point concentrations based on application rates would be minimal (less than an order of
7 magnitude).” Overall, the Washington State study is applicable to the proposed *Spartina* Control
8 Program because the projects involve similar exposure parameters; therefore, potential health haz-
9 ards associated with the use of glyphosate and surfactants would be less than significant.

10 However, the following mitigation measures are suggested to further reduce health risks from ex-
11 posure to chemical treatment.

12 **MITIGATION HS-3: Health Effects to the Public from Herbicide Application.** To minimize
13 risks to the public, mitigation measures for chemical treatment methods related to timing of herbi-
14 cide use, area of treatment, and public notification, shall be implemented by entities engaging in
15 treatment activities as identified below:

- 16 • Herbicide application shall be managed to minimize potential for herbicide drift, particu-
17 larly in areas where the public could be affected. Herbicide shall not be applied when winds
18 are in excess of 10 miles per hour or when inversion conditions exist (per Supplemental
19 Labeling for Aquamaster for Aerial Application in California Only), or when wind could
20 carry spray drift into inhabited areas. This condition shall be strictly enforced by the im-
21 plementing entity.
- 22 • Colored signs shall be posted at and/or near any public trails, boat launches, or other po-
23 tential points of access to herbicide application sites a minimum of 24 hours prior to
24 treatment. These signs shall inform the public that the area is to be sprayed with glyphosate
25 herbicide for weed control, and that the spray is harmful if inhaled. They will advise “no
26 entry” for humans and animals until a minimum of eight (8) hours after treatment, and that
27 date and time will be stated. A 24-hour ISP contact number shall be provided.
- 28 • Application of herbicides shall be avoided near areas where the public is likely to contact
29 water or vegetation as follows:
 - 30 A. Application of herbicides in or adjacent to high use areas shall not be allowed
31 within 24 hours prior to weekends and public holidays.
 - 32 B. If a situation arises (due to weather or other variables) that makes it necessary
33 to treat high-use areas on weekends or holidays, the areas shall be closed to the
34 public for 24 hours before and after treatment.
- 35 • At least one week prior to application, signs informing the public of impending herbicide
36 treatment shall be posted at prominent locations within a 500-foot radius of treatment sites
37 where homes, schools, hospitals, or businesses could be affected. Schools and hospitals
38 within 500 feet of any treatment site shall be separately noticed at least one week prior to
39 the application.
- 40 • No aerial spraying shall be conducted within 0.25 mile of a school, hospital, or other sensi-
41 tive receptor location.

42 **IMPACT HS-4: Health Effects to Workers or the Public from Accidents Associated with**
43 **Chemical Treatment.**