Chapter 6

Utilities and Service Systems and Agricultural Resources Impacts Assessments

6. Utilities and Service Systems and Agricultural Resources Impacts Assessment

This chapter analyzes effects of the WHCP on utility and service systems, and agricultural resources. WHCP effects on both of these resource areas are likely to be minimal. The chapter is organized as follows:

A. Utility and Service Systems Impacts Assessment
B. Agricultural Resources Impacts Assessment.

For each resource area, we first describe the environmental setting, and then provide an impact analysis and mitigation measures. The environmental setting sections describe the current status of utility and service systems, and agricultural resources, in the Delta. The discussions focus on water utility pumps and agricultural crops, which are areas of potential impact.

The impact analyses sections provide assessments of the specific environmental impacts potentially resulting from program operations. The discussions of impacts utilizes findings from WHCP research projects, technical information from government reports, and program experience. The impact assessments are based on technical information.

For each of the potential WHCP impacts to utility and service systems and agricultural resources, we provide a description of the impact, analyze the impact, classify the impact level, and identify mitigation measures to reduce the impact level.

The mitigation measures are specific actions that the DBW will undertake to avoid, or minimize, potential environmental impacts. The DBW has developed these actions based on twenty-five (25) years of program experience and discussions with local governments, water agencies, and County Agricultural Commissioners. The DBW maintains regular contact with these entities regarding potential impacts to pump systems and crops, and will respond to concerns expressed by these agencies to revise and/or add new mitigation measures, as necessary.

A. Utilities and Service Systems Impacts Assessment

1. Environmental Setting

Water-Related Infrastructure

Water conveyance infrastructure consists of many agricultural, industrial, and municipal diversions for supplying water to the Delta itself and for export by the SWP

Table 6-1
Delta Drinking Water Intakes

No.	Intake Name	Jurisdiction	Waterbody
1	Barker Slough Intake	Department of Water Resources	Sacramento River and Deep Water Channel
2	Harvey O. Banks Pumping Plant	Department of Water Resources	Clifton Court Forebay
3	C.W. "Bill" Jones Pumping Plant	U.S. Bureau of Reclamation (USBR)	Delta-Mendota Canal
4	Rock Slough Intake	Contra Costa Water District	Rock Slough and Contra Costa Canal
5	Old River Intake[1]	Contra Costa Water District	Old River
6	Mallard Slough Intake Pump Station	Contra Costa Water District and USBR	Mallard Slough and Suisun Bay

[1] CCWD is moving forward on a project to develop a new intake pump at Victoria Canal that will be used when the water quality at Old River Intake is reduced. This new pump, located at "7" in Exhibit 6-1, will not be completed until 2010.

and CVP. Diversions and conveyance require canals, waterways, levees, siphons, pumps, radial gates, and other miscellaneous infrastructure. We discuss agricultural diversions in Section B of this chapter.

Most water conveyance facilities in the Delta have been developed under the authority of the federal government's Central Valley Project (CVP) and California's State Water Project (SWP). As part of CVP development, exportation of water from the Delta began in 1940 with the completion of the Contra Costa Canal. Other major federal units were completed during the early 1950s, including the Delta-Mendota Canal and the Delta Cross Channel (DCC). The DCC transfers water across the Delta from the Sacramento River to the C.W. "Bill" Jones Pumping Plant (formerly the Tracy Pumping Plant), which serves the Delta-Mendota Canal. Numerous SWP facilities have been developed in the Delta, including the Harvey O. Banks Delta Pumping Plant, the California Aqueduct, and the North Bay Aqueduct (NBA). Combined, the CVP and SWP typically export approximately five (5) million acre feet of water annually for agricultural and urban use in Central and Southern California.

The Contra Costa Water District (CCWD) provides water to approximately 550,000 customers in central and eastern Contra Costa County. CCWD operates three pumps that divert drinking water from the Delta. There are power plants in the western Delta, at Antioch and Pittsburg, which utilize Delta waters for cooling. The East Bay Municipal Utility District operates the Mokelumne Aqueduct, providing water to 1.3 million people. Mokelumne Aqueduct pipelines cross through the southern portion of the Delta, but do not pump Delta waters.

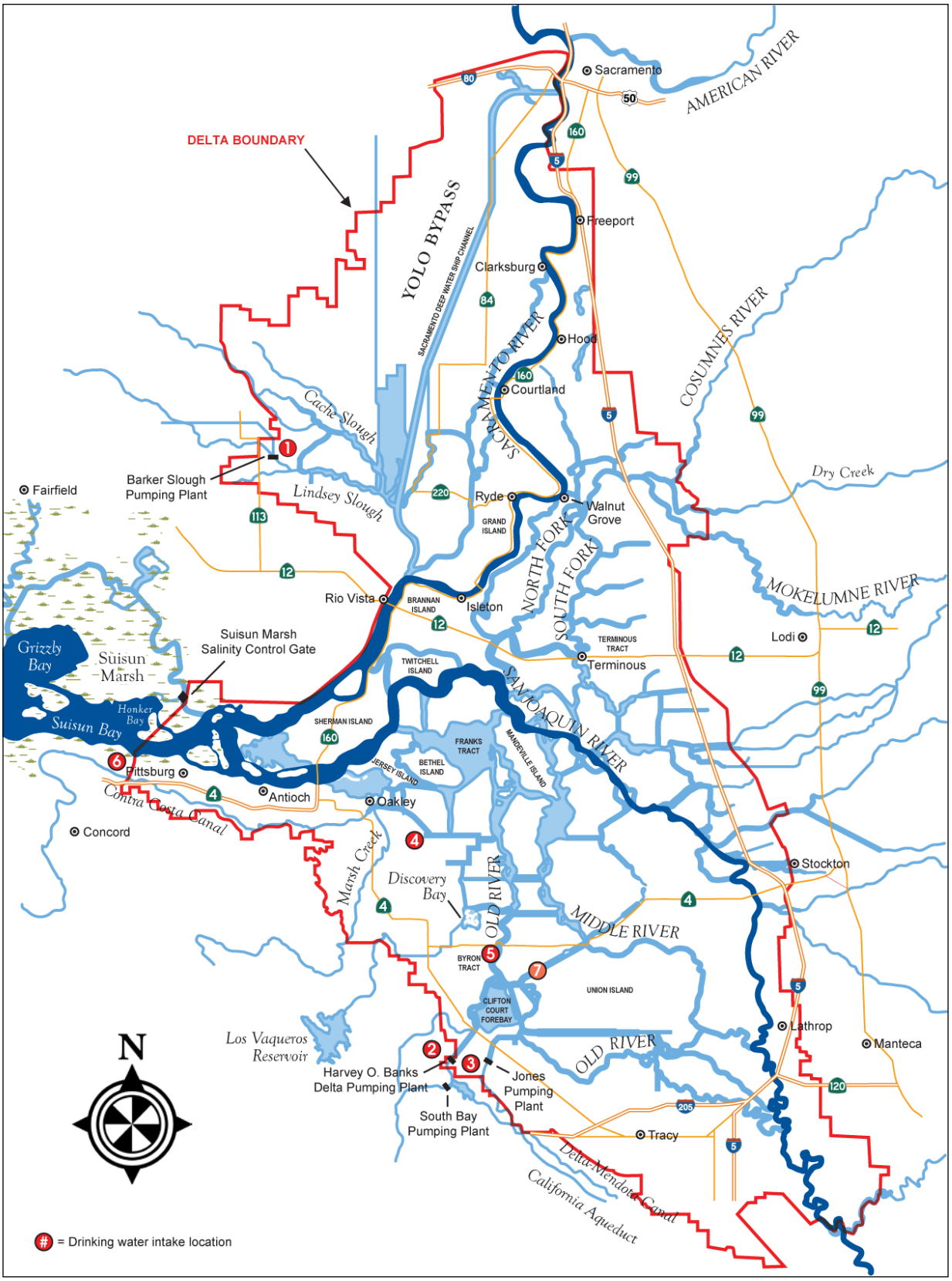
Exhibit 6-1, on the next page, and **Table 6-1,** above, identify six major drinking water intake pumps in and near the WHCP project area. The numbers in Table 6-1 refer to the locations on Exhibit 6-1.

Natural Gas Infrastructure

Natural gas was discovered in the Delta region in 1935 and has since been developed into a significant source and depot for underground storage. Gas fields, pipelines, underground storage areas, and related infrastructure are located in the Delta. Infrastructure consists mainly of pipelines and storage facilities owned by oil and gas companies, public utilities, and various independent leaseholders.

In 2004, there were approximately 240 operating natural gas wells in the Delta and Suisun Marsh (URS Corporation 2007). There

Exhibit 6-1
Drinking Water Intakes in the Sacramento-San Joaquin Delta



are more than twenty-five (25) underground natural gas storage areas located throughout the Delta and surrounding vicinity. Pacific Gas and Electric (PG&E) maintains a storage area under McDonald Island in the Central Delta that provides approximately 33 percent of the peak natural gas supply for the PG&E service area (URS Corporation 2007). In addition, fuel pipelines carry gasoline and aviation fuel from the Bay Area to the Central Valley through the Delta.

Public Services

Police protection is provided by various departments within the cities and counties of the Delta region. For example, the San Joaquin Sheriff's Department marine patrol division provides water patrol services to approximately 600 square miles of waterways in the Delta area. The Contra Costa County Sheriff's Department provides law enforcement services in the area. Fire protection service is provided by various departments in the Delta area, including the San Joaquin County Delta Fire Protection District and the Contra Costa Fire Protection District. Volunteer firefighters also respond to fire emergencies as needed. Fire suppression in areas not under the jurisdiction of a fire protection district is the responsibility of the landowners. Cities and counties in the region provide emergency services.

Solid Waste and Wastewater Treatment Services

There are over thirty (30) solid waste facilities located in or adjacent to the Delta and Suisun Marsh (URS Corporation 2007). Most facilities are located at the periphery of the Delta. There are thirteen (13) sewage treatment plants located in the Delta region, all located in the periphery, near developed areas (URS Corporation 2007).

Source: DBW, 2001.

Electric Utilities and Communication Infrastructure

Power transmission facilities have developed with the population growth of various communities surrounding the Delta. PG&E, Sacramento Municipal Utility District (SMUD), and the Western Area Power Administration have developed and oversee power transmission lines across the Delta islands and waterways. There are more than 500 miles of transmission lines and 60 substations within the Delta boundaries (URS Corporation 2007). Many of the transmission corridors are within the periphery of the Delta upland areas, including several natural gas-fired plants. Communication infrastructure in the region includes underground cable and fiber optic lines, and communication/transmission towers.

2. Impact Analysis and Mitigation Measures

For purposes of this analysis, we considered an impact to utilities and service systems to be significant and require mitigation if it would result in any of the following:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities

- Require or result in the construction of new storm water drainage facilities or expansion of existing facilities
- Require new or expanded entitlements for water supply
- Result in a determination by the wastewater treatment provider that it does not have adequate capacity to serve the project
- Exceed permitted landfill capacity
- Result in noncompliance with federal, state, or local statutes and regulations related to solid waste
- Result in problems for local or regional water utility intake pumps.

Table 6-2, on the next page, provides a summary of the potential WHCP impact for the one utility and service systems significance area which could potentially be affected. Table 6-2 also explains those utility and service systems significance areas in which there will be no impacts. We discuss potential impacts of the WHCP on water quality in Chapter 5.

Impact U1 – Water utility intake pumps: effects of WHCP treatments on water utility intake pumps

Herbicide treatments, handpicking, and herding may break fragments of water hyacinth lose into Delta waterways. These water hyacinth fragments would increase debris loading at intake facilities. Fragments have the potential to clog water utility intake pumps, requiring additional pump maintenance for affected water agencies.

The potential for water hyacinth fragments resulting from WHCP treatments to cause adverse effects on water utility intake pumps is low. However, should water hyacinth debris resulting from the WHCP clog or damage water utility intake pumps, it would represent a significant impact. This impact would be an **avoidable significant impact, reduced to a less-than-significant level by implementing the following two mitigation measures.**

- **Mitigation Measure U1a (same as Mitigation Measures W1b; W2d; W3d; and W5a)** – Follow the Memorandum of Understanding (MOU) protocol for herbicide applications within one (1) mile of Contra Costa Water District (CCWD) drinking water intake facilities.

  The MOU is an agreement between CCWD and DBW. Generally, no applications shall occur within Rock Slough, or within one mile of the confluence of Rock Slough and Old River, or within one mile of CCWD's Old River or Mallard Slough intake pumps without consensual agreement between CCWD and DBW. Herbicide applications within one mile of CCWD's water intakes may only occur with prior consent of CCWD. In order to treat within one mile of an intake, DBW must notify CCWD at least two weeks in advance, and make every reasonable attempt to schedule applications during periods when CCWD's intakes are shut down for environmental or maintenance reasons, allowing at least two complete tidal cycles between application and restart. This measure is primarily aimed at reducing the potential for drinking water contamination from theWHCP, however, it would also serve to minimize the potential for water hyacinth fragments to occur near water intake pumps.

- **Mitigation Measure U1b (same as Mitigation Measures B7a and W5c)** – Collect plant fragments during and immediately following handpicking, herding, or herbicide treatments.

  To maximize containment of plant fragments, crews will collect water hyacinth fragments. Crews will also be trained on the importance of minimizing fragment escape.

* * * * *

Table 6-2
Crosswalk of Utility and Service Systems Significance Criteria, Impacts, and Benefits of the WHCP

	Mitigation Measures	Unavoidable or Potentially Unavoidable Significant Impact	Avoidable Significant Impact	Less than Significant Impact	No Impact	Beneficial Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?					WHCP will have no wastewater treatment impacts	
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?					WHCP will not require construction or expansion of water or wastewater treatment facilities	
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?					WHCP will not require construction or expansion of storm water drainage facilities	
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?					WHCP will have no impact on water supplies	
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?					The WHCP will have no impact on wastewater treatment capacity.	
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?					WHCP will have no impact on landfill capacity. A small amount of handpicked water hyacinth will be placed on levee banks and allowed to naturally desiccate and disperse	
g) Comply with federal, state, and local statutes and regulations related to solid waste?					WHCP will comply with federal, state, and local statues and regulations related to solid waste	
h) Result in problems for local or regional water utility intake pumps?						Removal of water hyacinth from Delta waterways could reduce clogging of water utility intake pumps
Impact U1: Water utility intake pumps	13, 21		**X**			X

The potential impact to water intake systems is likely to be outweighed by the benefits to water intake pump systems that result from removing water hyacinth from Delta waterways. One concern resulting from water hyacinth's invasion in the Delta in the 1980s was plants blocking CVP and SWP pumps (U.S. Army Corps of Engineers 1985). In fact, the Bureau of Reclamation estimated that the WHCP saved the Bureau $400,000 per year in reduced operating and maintenance costs associated with removing water hyacinth from just the C.W. "Bill" Jones Pumping Plant (DBW 2001).

B. Agricultural Resources Impacts Assessment

1. Environmental Setting

The Delta is an important agricultural area. Farming in the Delta region began in the 1850s, following passage of the Swamp and Overflow Act, and Reclamation District Act, which provided for the sale of swamp and overflow lands for reclamation (DPC January 2001). Early farmers built a system of levees and irrigation ditches, and began growing a variety of vegetables, fruits, and grains. Over time, most farms have shifted from growing diverse crops, to growing a few crops, which are rotated (DPC January 2001). Crops that have been important at various times in the Delta include potatoes, asparagus, pears, and sugar beets. Characteristics that make the Delta well-suited to agriculture include: rich soil, ample water, a long growing season, mild climate, and proximity to end markets (DPC May 2001).

California is the fifth largest agricultural economy in the world, producing over 350 plant and animal commodities worth nearly $32 billion in 2006 (CDFA 2007). There were over 28 million acres of agricultural land (including grazing land) in California in 2004 (DOC 2006). In 2001, based on reported conversions of agricultural land (primarily for habitat conservation) the Delta region had about 360,000 acres in agriculture (DPC May 2001), just over 1 percent of the total agricultural acreage statewide, and approximately 74 percent of Delta land and water acreage. Estimated agricultural acreage, including harvested or grazed irrigated crop acres between 1998 and 2004 was 405,899 (Rich 2007). The average annual gross value of the agricultural output of the California's Delta during the 1998 to 2004 time period was approximately 2 percent of the statewide agricultural output.

The six counties with land area in the legal Delta (Alameda, Contra Costa, Sacramento, San Joaquin, Solano, and Yolo) produced over $2.6 billion in agricultural products in 2004 (USDA 2005) and $2.7 billion in 2006 (CDFA 2007). The value of Delta agricultural output represented over 20 percent of the total agricultural output in those six counties in 2004.

The additional WHCP counties (Fresno, Stanislaus, Madera, Tuolumne, Merced) produced a combined $10.3 billion in agricultural output. The WHCP project area in these counties is limited to the treatment sites on the San Joaquin, Merced, and Tuolumne Rivers.

Among the six counties with land area in the legal Delta, San Joaquin County has the greatest agricultural output. San Joaquin County produced the seventh highest value of agricultural products statewide, at $1.7 billion in 2006, with approximately 25 percent of that revenue generated in the Delta. In 2004, 63 percent of San Joaquin County's 912,602 acres were in agriculture, with almost 40 percent of those acres in the Delta.

Yolo County had almost 50 percent of its 653,452 acres in agricultural production, with approximately 40,000 of those acres in the Delta. Sacramento County had approximately 24 percent of land in agriculture in 2004, with over 50 percent of agricultural land located within the Delta. Solano County had approximately 30 percent of land in agriculture in 2004, with 20 percent of

Table 6-3
Total and Agricultural Acres* in Delta Counties

County	Total Acres	Delta Acres	2004 Agricultural Acres	1998 to 2004 Delta Agricultural Acres
San Joaquin	912,602	190,000	579,267	222,597
Yolo	653,452	75,000	324,228	39,661
Sacramento	636,083	95,000	150,798	79,558
Solano	582,373	86,000	181,313	34,579
Contra Costa	514,019	47,000	35,552	27,775
Alameda	525,338	10,000	9,362	1,730
Total	3,823,867	503,000	1,280,520	405,900

* Harvested, bearing acres, excluding dry rangeland/unirrigated pasture, and livestock areas. Sources: DOC, http://www.consrv.ca.gov; Delta Protection Commission (DPC), Inventory of Recreational Facilities (Sacramento, CA: DPC, November 1997); Jim Rich, "The Value of the Agricultural Output of the California Delta, A Revised Draft DWR Paper" (Sacramento, CA: DWR, February 22, 2007).

Table 6-4
Top Ten Delta Agricultural Products, Based on 1998 to 2004 Average Output

Agricultural Product	Annual Gross Value (in millions of dollars)
1. Wine grapes	$113.5
2. Livestock and poultry products	71.7
3. Asparagus	58.8
4. Processing tomatoes	55.9
5. Alfalfa hay	5.9
6. Nursery products	43.0
7. Pears	29.0
8. Corn, grain	27.3
9. Fresh tomatoes	26.9
10. Corn, silage	23.4

Source: Jim Rich, "The Value of the Agricultural Output of the California Delta, A Revised Draft DWR Paper" (Sacramento, CA: DWR, February 22, 2007).

Table 6-5
Top Ten Delta Agricultural Products, Based on 1998 to 2004 Irrigated Acreage

Agricultural Product	Delta Irrigated Acres
1. Alfalfa hay	70,405
2. Corn, grain	57,143
3. Wheat	39,967
4. Corn, silage	37,366
5. Irrigated pasture	27,346
6. Wine grapes	27,262
7. Processing tomatoes	26,604
8. Asparagus	22,927
9. Safflower	17,342
10. Misc. field crops	8,882

Source: Jim Rich, "The Value of the Agricultural Output of the California Delta, A Revised Draft DWR Paper" (Sacramento, CA: DWR, February 22, 2007).

agricultural land located within the Delta. Contra Costa County had only 5 percent of its 514,019 acres in agriculture in 2004, with the majority of agricultural acres in the Delta. Less than 2 percent of Alameda County falls within the Delta, and 20 percent of that land is agricultural. **Table 6-3,** above, summarizes total and Delta agricultural land use in the six Delta counties.

Tables 6-4 and **6-5,** above, identify the top ten Delta agricultural products between 1998 and 2004, based on annual average gross value, and acreage. These tables illustrate the diversity of agriculture in the Delta, with no single product dominating either acreage or economic output.

Table 6-6
Crosswalk of Agricultural Resources Significance Criteria, Impacts, and Benefits of the WHCP

	Mitigation Measures	Unavoidable or Potentially Unavoidable Significant Impact	Avoidable Significant Impact	Less than Significant Impact	No Impact	Beneficial Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?					WHCP will not convert prime farmland, unique farmland, or farmland of statewide importance to non-agricultural use	
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?					WHCP will not conflict with existing zoning from agricultural use, or a Williamson Act contract	
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?					WHCP will not involve other changes in the existing environment which would result in conversion of farmland to non-agricultural uses	
d) Adversely impact agricultural crops or agricultural operations, such as irrigation?						Removal of water hyacinth from Delta waterways could reduce clogging of agricultural pumps
Impact A1: Agricultural crops	3, 22		**X**			
Impact A2: Irrigation pumps	13, 22		**X**			X

2. Impact Analysis and Mitigation Measures

For purposes of this analysis, we considered an impact to agricultural resources to be significant and require mitigation if it would result in any of the following:

- Conflict with existing zoning for agricultural use, or a Williamson Act contract
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of farmland to non-agricultural use
- Adversely impact agricultural crops or agricultural operations.

Table 6-6, above, provides a summary of the potential WHCP impacts for the one agricultural resources significance area which could potentially be affected. Table 6-6 also explains those agricultural resource significance areas in which there will be no impacts.

Impact A1 – Agricultural crops: effects of WHCP herbicide treatments on agricultural crops

There are approximately 1,800 agricultural diversions in the Delta. During the peak summer irrigation season, diversions from these facilities collectively exceed 5,000 cubic feet per second (URS Corporation May 2007). The WHCP could adversely impact agricultural crops, since treatments would occur during the irrigation season.

WCHP herbicide treatments occurring adjacent to agricultural diversions could result in adverse impacts to nearby agricultural crops,

since irrigation with herbicide-treated water may injure irrigated vegetation. Both 2,4-D and glyphosate could reduce growth or possibly kill crops they contact.

WHCP herbicide treatments occurring adjacent to agricultural crops could also result in adverse impacts due to herbicide drift. As discussed in Chapter 3 (Impact 1), 2,4-D is a systemic herbicide specific to broadleaf plants. Exposure of broadleaf crops to 2,4-D could result in damage to crops. Glyphosate is a broad spectrum, non-selective, systemic herbicide. Exposure of any non-target crops to glyphosate could result in damage to crops.

The Weedar® 64 label specifies that the herbicide not be used adjacent to sensitive broadleaf crops, in particular grapes, tomatoes, and cotton. Grapes and tomatoes are grown throughout the Delta. The DBW will utilize glyphosate, rather than 2,4-D, when treating sites adjacent to sensitive broadleaf crops. The Weedar® 64 label also requires a delay in the use of treated waters for irrigation for three weeks after treatment, unless an approved assay shows that water does not contain more than 0.1 ppm 2,4-D. As discussed in Chapter 3, typical post-treatment 2,4-D levels are far below this threshold, even immediately post-treatment. The AquaMaster™ label does not specify any restrictions for use of treated water for irrigation.

While there is a potential risk to agricultural crops due to herbicide overspray, the likelihood of such effects is low. Herbicide application will be focused directly on target plants to decrease the possibility that concentrated herbicides would come in contact with agricultural crops. The DBW will follow herbicide label instructions that reduce herbicide drift. These steps include using the largest spray droplets, and lowest spray pressure, that will provide sufficient coverage and control. Furthermore, DBW will not treat at a particular site if the wind is greater than 10 mph (or 7 mph in Contra Costa County).

While there is also a potential risk to agricultural crops due to irrigating with water following WHCP herbicide treatments, the likelihood of such effects is similarly low. WHCP environmental monitoring has shown consistently low herbicide levels immediately following WHCP treatments. Tidal movement and water flow in the Delta promote dilution of WHCP herbicides.

Should agricultural crops adjacent to WHCP treatment sites be adversely affected by herbicide drift or irrigation waters containing WHCP herbicides, it would represent a significant impact. This impact would be an **avoidable significant impact, reduced to a less-than-significant level by implementing the following two mitigation measures.**

- **Mitigation Measure A1a (same as Mitigation Measures W5b)** – Notify County Agricultural Commissioners about WHCP activities.

  Before an application may occur, DBW shall file Pesticide Use Recommendations (PUR) and a Notice of Intent (NOI) with the appropriate County Agricultural Commissioner (CAC) office. Each NOI will include the site number, spray dates, locations, and herbicides and adjuvants to be used. NOIs will be submitted by no later than 2pm on the Wednesday before the upcoming treatment week. Based on information in the NOIs, CAC's could inform land owners of particular periods of time during which irrigation should not occur. If necessary, DBWg shall also obtain a Restricted Use Permit (RUP) from all appropriate CACs.

- **Mitigation Measure A1b (same as Mitigation Measures B1c; B2f; H2d; W1d; W2e; and W3e)** – Conduct herbicide treatments in order to minimize potential for drift.

  In addition to the label requirements noted above, DBW will, to the degree possible, schedule herbicide applications to

occur at high tide, or at a point in the tidal cycle determined by the field supervisor to provide the least non-target impact at a particular site. In general, treatment at high tide will allow for better spray accuracy and access and will provide for greater dilution volume of herbicides. DBW crews will change nozzle type and spray pressures whenever conditions warrant, limiting the amount of herbicide which may inadvertently contact agricultural crops.

Impact A2 – Irrigation pumps: effects of WHCP treatments on agricultural irrigation

Herbicide treatments, handpicking, and herding may break fragments of water hyacinth lose into Delta waterways. These water hyacinth fragments would increase debris loading at the 1,800 agricultural irrigation intakes located throughout the Delta. Fragments have the potential to clog water agricultural irrigation intakes, requiring additional intake maintenance for affected farmers.

The potential for fragments of water hyacinth from herbicide treatment, handpicking, or herding to cause adverse effects to agricultural irrigation intakes is low. However, should water hyacinth fragments resulting from the WHCP clog or damage agricultural irrigation intakes, it would represent a significant impact. This impact would be an **avoidable significant impact, reduced to a less-than-significant level by implementing the following two mitigation measures.**

- **Mitigation Measure A2a (same as Mitigation Measures W5b and A1a)** – Notify County Agricultural Commissioners about WHCP activities.

  Before an application may occur, DBW shall file Pesticide Use Recommendations (PUR) and a Notice of Intent (NOI) with the appropriate County Agricultural Commissioner (CAC) office. Each NOI will include the site number, spray dates, locations, and herbicides and adjuvants to be used. NOIs will be submitted by no later than 2pm on the Wednesday before the upcoming treatment week. Based on information in the NOIs, CAC's could inform land owners of particular periods of time during which irrigation should not occur. If necessary, DBW shall also obtain a Restricted Use Permit (RUP) from all appropriate CACs.

- **Mitigation Measure A2b (same as Mitigation Measures B7a and W5c)** – Collect plant fragments during and immediately following treatments.

  To maximize containment of plant fragments, crews will collect water hyacinth fragments. Crews will also be trained on the importance of minimizing fragment escape.

* * * * *

There are also potential benefits to agricultural resources resulting from the WHCP. Left untreated, water hyacinth can potentially interfere with pumping at the 1,800 agricultural irrigation intakes throughout the Delta. Clogging by water hyacinth may result in inefficient pumping, increasing pumping costs, and possible mechanical failure of pumps. Prior to the start of the WHCP, in a letter to the U.S. Army Corps of Engineers, the San Joaquin Farm Bureau Federation stated that growers were facing increased costs from efforts to open clogged channels where water hyacinth was decreasing the flow of water to pumps and clogging screens (U.S. Army Corps of Engineers 1985).

This section identified six mitigation measures to address three potential impacts to utility and service systems and agricultural resources. Two mitigation measures are duplicative, as they each apply to two impacts. **Table 6-7**, on the next page, combines and summarizes the utility and service systems and agricultural resources mitigation measures.

Table 6-7
Summary of Potential Utility and Service Systems and Agricultural Resources Impacts and Mitigation Measures

	Mitigation Measure Summary[1]	Mitigation Measure Number	Impacts Applied To	Same As Prior Mitigation Numbers
3.	Conduct herbicide treatment in order to minimize potential for drift	Mitigation Measure A1b	Impact A1: Agricultural crops	B1c; B2f; H2d; W1d; W2e; W3e
13.	Collect plant fragments during and immediately following treatments	Mitigation Measure U1b Mitigation Measure A2b	Impact U1: Water utility intake pumps Impact A2: Irrigation pumps	B7a; W5c
21.	Follow the Memorandum of Understanding (MOU) protocol for herbicide applications within one (1) mile of Contra Costa Water District (CCWD) drinking water intake facilities	Mitigation Measure U1a	Impact U1: Water utility intake pumps	W1b; W2d; W3d; W5a
22.	Notify County Agricultural Commissioners about WHCP activity	Mitigation Measure A1a Mitigation Measure A2a	Impact A1: Agricultural crops Impact A2: Irrigation pumps	W5c

[1] Please refer to the text for the complete mitigation measure description.