

**Pesticides Application Plan (PAP) for the NPDES Vector Control Permit Application of the San Joaquin County Mosquito and Vector Control District (*revised 10/21/2011*)**

1. Target areas: surface waters and waters of the U.S. within San Joaquin County, CA. Map of San Joaquin County enclosed.

In prior years, the District has applied adulticides and/or larvicides directly to or in the vicinity of the following water bodies:

Dry Creek, tributary to Mokelumne River  
Goose Creek, tributary to Dry Creek  
Coyote Creek, tributary to Dry Creek  
Jahant Slough, tributary to Tracy Lakes  
Tracy Lakes  
Gill Creek, tributary to Mokelumne River  
Murphy Creek, tributary to Mokelumne River  
Camanche Reservoir  
Lodi Lake  
Mokelumne River, tributary to Sacramento River-San Joaquin River Delta  
North Fork Mokelumne River  
South Fork Mokelumne River  
Beaver Slough, tributary to South Fork Mokelumne River  
Hog Slough, tributary to South Fork Mokelumne River  
Sycamore Slough, tributary to South Fork Mokelumne River  
Upland Canal, tributary to White Slough  
Bear Creek, tributary to Disappointment Slough  
Pixley Slough, tributary to Disappointment Slough  
Telephone Cut, tributary to Bishop Cut  
Paddy Creek, tributary to Bear Creek  
Middle Paddy Creek, tributary to Paddy Creek  
South Paddy Creek, tributary to Paddy Creek  
Mosher Creek, tributary to Mosher Slough  
Mosher Slough, tributary to Disappointment Slough  
Five Mile Slough, tributary to Disappointment Slough  
Duck Creek, tributary to Mormon Slough  
Indian Creek, tributary to Calaveras River  
Calaveras River, tributary to San Joaquin River  
Podesto Lake  
Mormon Slough, tributary to Stockton Diverting Canal  
Stockton Diverting Canal, tributary to Calaveras River  
Mormon Slough, tributary to Stockton Deep Water Channel  
Stockton Deep Water Channel, tributary to San Joaquin River  
Smith's Canal, tributary to San Joaquin River  
Potter Creek, tributary to Mormon Slough  
North Fork Duck Creek, tributary to Duck Creek  
Duck Creek, tributary to Walker Slough  
Walker Slough, tributary to French Camp Slough  
Rock Creek, tributary to LittleJohns Creek  
LittleJohns Creek, tributary to North and South LittleJohns creeks  
North LittleJohns Creek, tributary to French Camp Slough  
South LittleJohns Creek, tributary to N. Fork S. LittleJohns Creek  
South LittleJohns Creek, tributary to S. Fork S. LittleJohns Creek  
N. Fork S. LittleJohns Creek, tributary to French Camp Slough  
S. Fork S. LittleJohns Creek, tributary to French Camp Slough  
French Camp Slough, tributary to San Joaquin River  
Lone Tree Creek, tributary to S. Fork S. LittleJohns Creek  
Stanislaus River, tributary to San Joaquin River  
San Joaquin River, tributary to Sacramento River-San Joaquin River Delta

Walthall Slough, tributary to San Joaquin River  
Red Bridge Slough, tributary to Walthall Slough and San Joaquin River  
Tom Paine Slough, tributary to Old River  
Sugar Cut, tributary to Tom Paine Slough and Old River  
Hospital Creek  
PegLeg Creek, tributary to Lone Tree Creek (sw)  
Middle Fork Lone Tree Creek, tributary to Lone Tree Creek (sw)  
Sulpher Springs Gulch Creek, tributary to Lone Tee Creek (sw)  
North Fork Lone Tree Creek, tributary to Lone Tree Creek (sw)  
Corral Hollow Creek  
Hellsinger Creek, tributary to Corral Hollow Creek  
Patterson Run  
Mountain House Creek  
White Slough  
Honker Cut  
Disappointment Slough  
Ten Mile Slough  
Fourteen Mile Slough  
Little Potato Slough  
Potato Slough  
Venice Cut  
Venice Reach  
Mandeville Reach  
Mandeville Cut  
Three River Reach  
Burns Reach  
Dredge Cut  
Twentyone Mile Cut  
Haypress Reach  
Bishop Cut  
Turner Cut  
Empire Cut  
Whiskey Slough  
Latham Slough  
Columbia Cut  
Middle River  
Old River  
Connection Slough  
Dredger Cut  
North Victoria Canal  
Victoria Canal  
Trapper Slough  
Paradise Cut  
Salmon Slough  
Grant Line Canal  
Fabian and Bell Canal

In prior years, the District has applied adulticides and/or larvicides directly to or in the vicinity of canals, ditches, or other constructed conveyance facilities owned and controlled by:

Byron-Bethany Irrigation District  
Banta-Carbona Irrigation District  
California Irrigation District  
Central San Joaquin Water Conservation District  
Lathrop Irrigation District  
Neglee-Burk Irrigation District  
New Del Puerto Water District  
North San Joaquin Water Conservation District  
Nyjo Water District

Oakdale Irrigation District  
 South San Joaquin Irrigation District  
 Stockton East Water District  
 Woodbridge Irrigation District  
 West Side Irrigation District  
 West Stanislaus Irrigation District  
 Reclamation District #1 Union Island  
 Reclamation District #2 Union Island  
 Reclamation District #17 Mossdale  
 Reclamation District #38 Staten Island  
 Reclamation District #348 New Hope  
 Reclamation District #403 Rough and Ready Island  
 Reclamation District #404 Boggs Tract  
 Reclamation District #524 Middle Roberts Island  
 Reclamation District #544 Upper Roberts Island  
 Reclamation District #548 Terminous  
 Reclamation District #684 Lower Roberts Island  
 Reclamation District #756 Bouldin Island  
 Reclamation District #773 Fabian Tract  
 Reclamation District #828 Weber Tract  
 Reclamation District #1007 Pico and Nagle  
 Reclamation District #1608 Smith Tract  
 Reclamation District #2023 Venice Island  
 Reclamation District #2027 Mandeville Island  
 Reclamation District #2028 Bacon Island  
 Reclamation District #2029 Empire Tract  
 Reclamation District #2030 McDonald Island  
 Reclamation District #2033 Brack Tract  
 Reclamation District #2038 Lower Jones Tract  
 Reclamation District #2039 Upper Jones Tract  
 Reclamation District #2040 Victoria Island  
 Reclamation District #2041 Medford Island  
 Reclamation District #2042 Bishop Tract  
 Reclamation District #2044 King Island  
 Reclamation District #2058 Pescadero District  
 Reclamation District #2062 Stewart Tract  
 Reclamation District #2064 River Junction  
 Reclamation District #2072 Woodward Island  
 Reclamation District #2074 Sargent-Barnhart Tract  
 Reclamation District #2075 McMullin Ranch  
 Reclamation District #2085 Kasson District  
 Reclamation District #2086 Canal Ranch  
 Reclamation District #2089 Stark Tract  
 Reclamation District #2094 Walthall  
 Reclamation District #2095 Paradise Junction  
 Reclamation District #2096 Wetherbee Lake  
 Reclamation District #2101 Blewett  
 Reclamation District #2107 Mossdale  
 Reclamation District #2108 Tinsley  
 Reclamation District #2113 Fay Island  
 Reclamation District #2114 Rio Blanco Tract  
 Reclamation District #2115 Shima Tract  
 Reclamation District #2116 Holt Station  
 Reclamation District #2118 Little Mandeville Island  
 Reclamation District #2119 Wright-Elmwood Tract  
 Reclamation District #2126 Atlas Tract  
 California Department of Water Resources – California Aqueduct  
 U.S. Bureau of Reclamation - Delta Mendota Canal

***Avena Drainage District***  
***New Mariposa Drainage District***

*California Water District (private)*  
*City of Escalon*  
*City of Lathrop*  
*City of Lodi*  
*City of Manteca*  
*City of Ripon*  
*City of Stockton*  
*City of Tracy*  
*Farmington Water Company (private)*  
*Linden Water District (public)*  
*Mountain House CSD (public)*  
*San Joaquin County, including dependent community service districts*

2. Please see the following enclosed references that identify the factors influencing the decision to select pesticide applications for vector control:
- **Best Management Practices for Mosquito Control in California.** 2011. California Department of Health Services, Vector-Borne Disease Section; *see page 31, Mosquito Surveillance, for surveillance information that determines the need for mosquito control; see pages 27-30, Chemical Control, for information on chemical control as part of an IPM plan; see pages 35-39, Appendix B, Compounds Approved for Mosquito Control in California, for information on the selection and use of pesticides used for mosquito control.*
  - **California Mosquito-Borne Virus Surveillance & Response Plan.** 2011. California Department of Health Services, Vector-Borne Disease Section; *see pages 8-9, Mosquito Control, for information on larval and adult mosquito control based on surveillance; see page 16-18, Characterization of Conditions and Responses, for information on larval and adult mosquito control based on risk evaluation (normal season, emergency planning, and epidemic conditions).*
  - **Operational Plan for Emergency Response to Mosquito-Borne Disease Outbreaks.** 2010. California Department of Public Health, Vector-Borne Disease Section; *see pages 8-9, Action Associated with “Trigger Points”, for information on chemical mosquito control based on risk evaluation (normal season, emergency planning, and epidemic conditions); see page 19, Appendix 2, Mosquito-Borne Disease Emergency Roles and Responsibilities of Public Agencies, for information on responsibilities of mosquito and vector control agencies to perform control of larval and adult mosquitoes.*
  - **Overview of Mosquito Control Practices in California.** 2008. California Department of Public Health, Vector-Borne Disease Section; *see page 11, Integrated Pest Management, for information on utilizing chemical control as part of an IPM program for mosquito control; see pages 15-17, Chemical Control of Mosquitoes, for information on chemical mosquito control.*
  - **Epidemic/Epizootic West Nile Virus in the United States: Guidelines for Surveillance, Prevention, and Control.** 2003. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention; *see page 28, number 3, Virus Surveillance, for information on arbovirus surveillance that triggers the need to consider mosquito control; see pages 30-35, section C., Chemical Control, for information on chemical mosquito control.*
  - **Integrated Pest Management Plan for Certain Vectors in San Joaquin County, CA.** 2008. San Joaquin County Mosquito and Vector Control District; *see pages 18-21, Surveillance, for information on how surveillance information is used to determine a mosquito control strategy, including chemical control; see pages 22-23, Thresholds, for information on thresholds used to determine when mosquito control is warranted; see pages 27-31, Chemical Control, for information on chemical control as a component of the IPM plan.*

The use of pesticides to control adult and immature stages of mosquitoes is determined when other control methodologies cannot or will not be feasible. Following are examples of the limitations that other control methodologies present that may then trigger the need for a pesticide application:

Biological control (use of mosquitofish) has definite limitations. For example:

- They can seldom inhabit two important larval sites: small containers and highly polluted water. In temporary water sites, repeated introduction of fish will be required.
- Mosquito-eating fish can harm beneficial organisms (e.g., other fish or insect predators) by eating their eggs and young or by superior competition for food. Their release carries the potential to reduce or eliminate non-target species.
- Larvivorous fish may be preyed upon by larger fish. Their vulnerability to fungi and other pathogens may keep their populations in check.
- Where larvivorous fish are harvested or removed, their populations could be reduced to a level inadequate for mosquito control.
- Mosquito-eating fish may prefer food other than mosquito larvae. In some situations, mosquito larvae production outruns the increase in fish population that would be necessary for control.
- The District can only rear certain amounts of mosquitofish per year in. All mosquitofish produced are used in the District's biological control element of the IPM program.

Natural control (a pest management strategy whereby the environment is disturbed as little as possible) has definite limitations. For example:

- Natural control is sometimes difficult to implement or assess due to the amount of man-made or manipulated vector sources found in the District. Natural control is advocated for sites that are remote and undisturbed, to the least amount practical, for the individual vector specie being contemplated for control.

Physical control (or mosquito habitat modification) has definite limitations. For example:

- Only man-made or managed mosquito sources are capable of being physically altered to reduce mosquito abundance. In some cases physically altered lands will reduce, but not eliminate mosquito breeding, requiring the implementation of other forms of control, including biological and chemical control.
- **Pesticides and Public Health: Integrated Methods of Mosquito Management.** 2001. U.S. Environmental Protection Agency; [see pages 17-20](#)

3. Pesticide products or types expected to be used and the method in which they will be applied:

<b>Pesticide Product</b>	<b>EPA Reg.</b>	<b>Method of Application</b>
Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7395	1021-1570	Ultra low volume (ULV), vehicle (ground) and aircraft (air)
Evergreen Crop Protection EC 60-6	1021-1770	ULV ground and air
Pyrenone Crop Spray	432-1033	ULV ground and air
Prentox Pyronyl Crop Spray	655-489	ULV ground and air
Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7396	1021-1569	ULV ground and air
Aquahalt Water-Based Adulticide	1021-1803	ULV ground and air
Pyrocide Mosquito Adulticide 7453	1021-1803	ULV ground and air
Pyrenone 25-5 Public Health Insecticide	432-1050	ULV ground and air
Prentox Pyronyl Oil Concentrate #525	655-471	ULV ground
Prentox Pyronyl Oil Concentrate or 3610A	655-501	ULV ground and air
Permanone 31-66	432-1250	ULV ground and air

Kontrol 30-30 Concentrate	73748-5	ULV ground and air
Aqualuer 20-20	769-985	ULV ground and air
Aqua-Reslin	432-796	ULV ground and air
Aqua-Kontrol Concentrate	73748-1	ULV ground and air
Kontrol 4-4	73748-4	ULV ground and air
Biomist 4+12 ULV	8329-34	ULV ground and air
Permanone RTU 4%	432-1277	ULV ground and air
Prentox Perm-X UL 4-4	655-898	ULV ground and air
Allpro Evoluer 4-4 ULV	769-982	ULV ground and air
Biomist 4+4	8329-35	ULV ground and air
Kontrol 2-2	73748-3	ULV ground and air
Scourge Insecticide with Resmethrin/Piperonyl Butoxide 18%+54% MF Formula II	432-667	ULV ground and air
Scourge Insecticide with Resmethrin/Piperonyl Butoxide 4%+12% MF Formula II	432-716	ULV ground and air
Anvil 10+10 ULV	1021-1688	ULV ground and air
AquaANVIL Water-based Adulicide	1021-1807	ULV ground and air
Duet Dual-Action Adulicide	1021-1795	ULV ground and air
Anvil 2+2 ULV	1021-1687	ULV ground and air
Zenivex E20	2724-791	ULV ground and air
Trumpet EC Insecticide	5481-481	ULV ground and air
Fyfanon ULV Mosquito	67760-34	ULV ground and air

Vectolex CG Biological Larvicide	73049-20	Conventional, vehicle (ground), hand-held (hand), and aircraft (air)
Vectolex WDG Biological Larvicide	73049-57	Conventional ground/hand/air
Vectolex WSP Biological Larvicide	73049-20	Conventional ground/hand
Vectobac Technical Powder	73049-13	Conventional ground/hand/air
Vectobac-12 AS	73049-38	Conventional ground/hand/air
Aquabac 200G	62637-3	Conventional ground/hand/air
Aquabac XT	62637-1	Conventional ground/hand/air
FourStar Briquets	83362-3	Conventional ground/hand
FourStar SBG	85685-1	Conventional ground/hand/air
Spheratax SPH (50G) WSP	84268-2	Conventional ground/hand
Spheratax SPH (50G)	84268-2	Conventional ground/hand/air
Teknar HP-D	73049-404	Conventional ground/hand/air
Vectobac-G Biological Mosquito Larvicide Granules	73049-10	Conventional ground/hand/air
Vectomax CG Biological Larvicide	73049-429	Conventional ground/hand/air
Vectomax WSP Biological Larvicide	73049-429	Conventional ground/hand
Vectomax G Biological Larvicide/Granules	73949-429	Conventional ground/hand/air
Zoecon Altosid Pellets	2724-448	Conventional ground/hand/air
Zoecon Altosid Pellets	2724-375	Conventional ground/hand/air
Zoecon Altosid Liquid Larvicide Mosquito Growth Regulator	2724-392	Conventional ground/hand/air
Zoecon Altosid XR Entended Residual Briquets	2724-421	Conventional ground/hand
Zoecon Altosid Liquid Larvicide Concentrate	2724-446	Conventional ground/hand/air
Zoecon Altosid XR-G	2724-451	Conventional ground/hand/air
Zoecon Altosid SBG Single Brood Granule	2724-489	Conventional ground/hand/air
Mosquito Larvicide GB-1111	8329-72	Conventional ground/hand/air

BVA 2 Mosquito Larvicide Oil	70589-1	Conventional ground/hand/air
BVA Spray 13	55206-2	Conventional ground/hand/air
Agnique MMF Mosquito Larvicide & Pupicide	53263-28	Conventional ground/hand/air
Agnique MMF G	53263-30	Conventional ground/hand/air
Abate 2-BG	8329-71	Conventional ground/hand/air
5% Skeeter Abate	8329-70	Conventional ground/hand/air
Natular 2EC	8329-82	Conventional ground/hand/air
Natular G	8329-80	Conventional ground/hand/air
Natular XRG	8329-83	Conventional ground/hand/air
Natular XRT	8329-84	Conventional ground/hand

4. Following is a general description and listing of the application areas and the target areas in San Joaquin County that are being planned to be applied or may be applied:

***Aquatic sources, such as surface waters, waters of the US, water bodies, canals, ditches, or other constructed conveyance facilities that are governed by the NPDES permit are within the boundaries of entities identified on the enclosed maps:***

- ***Surface waters, waters of the US, and water bodies of public and private ownership: [San Joaquin County GIS Base Map](#)***
- ***Canals, ditches, or other constructed conveyance facilities of irrigation districts: [San Joaquin County GIS Irrigation Districts map](#)***
- ***Canals, ditches, or other constructed conveyance facilities of reclamation districts: [San Joaquin County GIS Reclamation Districts map](#)***
- ***Canals, ditches, or other construction conveyance facilities of water districts, including all cities within San Joaquin County and San Joaquin County proper: [San Joaquin County GIS Water Districts map](#)***

5. The other control methods used and their limitations include:

- **Biological Control.** Biological control is the intentional use of natural predators, parasites or pathogens to achieve desired reductions in pest and vector population levels. The use of biological control is a primary method of control if the use of other control methods presents environmental concern and current vector populations are low or tolerable. The use of biological control organisms and strategies is limited to those that have been researched and field tested against target and non-target organisms. In addition, any biological control organism to be considered for use by the District will also be recognized and authorized by appropriate federal, state, and local agencies.

The District operates a large-scale aquaculture facility that produces several thousand pounds of mosquitofish annually. The fish are planted in aquatic sites in agriculture (e.g. rice), environmental (e.g. managed wetlands), residential (e.g. swimming pools), and industrial (e.g. storm water retention ponds) sources.

- **Legal abatement.** Legal abatement is the process of preventing vectors through the enactment of legislation that enforces control measures or imposes regulations to prevent the production, introduction, or spread of pests and vectors. Legal abatement includes the use of federal, state and local guidelines and laws designed to prevent the creation and/or harborage of pests and vectors. The District regularly enforces the California Health and Safety Code, which specifically addresses the creation and/or harborage of vectors and vector breeding sites.

The District's legal abatement policy provides for a three-step process to work with landowners to limit mosquito production on lands under their control. The steps proceed from providing the landowner with information that acknowledges their creation of a public nuisance and specific recommendations on mosquito prevention (including reference to CDPH's **Best Management Practices for Mosquito Control in California, 2011**). If the mosquito problem continues, the landowner can be cited per California Health and Safety Code regulations (Section 2000 et seq). Not all mosquito sources can be legally abated. Naturally-occurring sources created by rainfall (e.g. native tree holes and vernal pools) would be exempt from the District's implementation of legal abatement.

- Natural control. Natural control is a pest management strategy in which the environment is disturbed as little as possible. Reliance is placed on naturally occurring parasites, predators, and diseases to control vectors. One scientific definition of natural control is "... the maintenance of a fluctuating population density within definable upper and lower limits over a period by the combined affects of abiotic and biotic elements in the environment". Natural control is sometimes difficult to implement or assess due to the amount of man-made or manipulated vector sources found in the District. Natural control is advocated for sites that are remote and undisturbed, to the least amount practical, for the individual vector specie being contemplated for control.
- Physical control. Physical control, or habitat modification, is achieved by altering the major ecological components of the vector's environment associated with the establishment and production of the vector's immature stages. The primary operational objective of physical control is to reduce the vector carrying capacity of a site to preclude the use of control methods that would adversely impact the environment and wildlife. The District complies with requirements, as specified, of any general permit issued to the California Department of Health Services as the lead agency, pertaining to physical environmental modification to achieve pest and vector prevention. Additionally, the District routinely reviews and comments on proposed projects within San Joaquin County being considered by the various city and county departments, thus providing opportunities to "design out" vector breeding conditions prior to construction and development.

6. The amount and type of product needed and how this amount was determined is difficult to project on a prospective basis, however, the San Joaquin County Mosquito and Vector Control District can provide the amount and type of products used in 2010 as an estimate of what may be used in 2011 and outlying years. Following is the 2010 information:

PRODUCT NAME	EPA REG. NO.	AMOUNT USED	# OF APPLICATIONS	ACRES TREATED
Pyrenone Crop Spray	432 1033	17.79 gal	123	490.96
Suspend SC	432 763	8.12 gal	294	341.41
Aquabac XT	62637 1	531.64 gal	1076	2,136.78
BVA 2	70589 1	8,007.39 gal	2,048	2,821.73
Golden Bear 1111	8329 72 AA	107.02 gal	152	32.21
Agnique MMFG	53263 30	65.44 lb	10	9.28
Agnique MMF	2302 14	6.66 gal	6	19.52
Evergreen EC 60-6	1021 1770 AA	495.67 gal	295	98,167.12
Pyroicide 7396	1021 1569	243.06 gal	194	37,551.74
Prentox Pyronyl Crop	655 489 ZA	0.61 gal	4	19.65
Pyronyl Crop Oil 525	655 471	20.5 gal	18	3,116.60
Trumpet EC	5481 481	607.50 gal	8	78,436
VectoBac 12 AS	73049 38	11034.1 gal	2,309	4,586.57
VectoBac G	73049 10	238,940.40 lb	278	47,425.5
VectoLex CG	73049 20	60.64 lb	30	9.3
VectoLex WDG	73049 57	68.25 lb	39	139.26
VectoLex WSP	73049 20	2.25 lb	4	0.73
VectoMax CG	73049 429	12,658.92 lb	1,636	14,658.21
Altosid Pellets WSP	2724 488 ZC	64.62 lb	53	13.40
Altosid Briquets	2724 375 64833	241.25 lb	411	651.24
Altosid Briquets XR	2724 421 AA 64833	1,010.41 lb	614	257.06
Altosid Pellets	2724 448 ZA 64833	1,619.97 lb	368	527.281



Altosid Liquid Larv.	2724 446	42.5 gal	5	1,372
Abate 5% Skeeter	8329 70	682.00 lb	5	212

7. Representative monitoring locations and the justification for selecting these locations are provided in the MVCAC NPDES Coalition Monitoring Plan.
8. Items 2.a. through 2.g. (above) were used in the evaluation of available BMPs for the determination of feasible alternatives to selected pesticide applications that could reduce potential water quality impacts.

*The District has long emphasized environmental stewardship while accomplishing its public health mission, primarily through strict adherence to an IPM (Integrated Pest Management) approach to the control of mosquitoes and other vectors of human disease. As such, District policies emphasize training, vector and pathogen surveillance, the integration of biological and physical control practices with chemical control (pesticides), and the judicious use of appropriate control tools only when vectors exceed specific thresholds.*

### **Biological Control of Mosquitoes**

*The District places a high priority on collaborating with and augmenting natural phenomena that help limit the production of mosquitoes. District staff has traditionally implemented a four-pronged approach to biological control of mosquitoes. The general elements of biological control used by the District are 1) rearing, stocking, and providing for limited public use the mosquitofish, Gambusia affinis, to eat larval mosquitoes in sites where mosquitofish are unlikely to cause significant adverse impacts on native species; 2) support of programs and studies to identify, develop, and evaluate additional biocontrol agents that can be produced at reasonable cost; 3) collaboration with land-owners and managers to implement land and water management practices that protect and support populations and dispersal of native mosquito predators; and 4) policies and training designed to protect native predators.*

*A high priority of the District is collaboration with land-owners on improving land and water management to reduce mosquito production while maintaining other desirable ecological functions of the sites and a major focus of this work is manipulating habitats to promote the survival, reproduction, and dispersal of natural aquatic predators, including fish and aquatic invertebrates. Target sites include stormwater treatment facilities, irrigated pastures, duck clubs, sewer treatment marshes, etc. Environmental protection in these projects is ensured through close collaborations with environmental interests, landowners and permitting agencies. Two sub-activities, Physical Control/Source Reduction and Vegetation Management, have been traditionally distinguished, and are discussed below.*

*Finally, training and treatment protocols for pesticide use emphasize protection of predators when they are present in sites with mosquito larvae. The District's larvicide treatment protocols include periodic review of application sites to determine whether a mosquito-producing site also has the presence of any significant populations of predators, and if so, to avoid pesticides or to use the pesticide with the least possible impact on natural predators if mosquito populations are sufficient to require prompt treatment.*

## **Physical Control**

*The District routinely works with landowners to encourage mosquito prevention flooding regimes, water circulation, and/or predator dispersal in sites that are likely to produce consistently high mosquito populations otherwise. Development proposals from cities and the county that include aquatic features are routinely commented on by staff, and recommendations to include mosquito prevention BMPs are required for project permits.*

## **Vegetation Management**

*The amount of herbicides used by the District for vegetation thinning in selected high-producing mosquito sites has traditionally been very limited. Vegetation management is conducted with hand tools (“brushing”) as needed to allow access for vector surveillance.*

9. Items 2.a. through 2.g. (above) were used in the evaluation of available BMPs for the determination of feasible alternatives to selected pesticide applications that could reduce potential water quality impacts.

### **Measures to prevent pesticide spill**

*All pesticide applicators receive annual spill prevention and response training. District employees ensure daily that application equipment is in proper working order. Spill mitigation devices are placed in all vehicles and pesticide storage areas.*

### **Measures to ensure that only a minimum and consistent amount is used**

*Application equipment is calibrated at least annually as required by the Department of Pesticide Regulations (DPR) and the terms of a cooperative agreement with the California Department of Public Health (CDPH).*

### **A plan to educate Coalition’s or Discharger’s staff and pesticide applicator on any potential adverse effects to waters of the U.S. from the pesticide application**

*This is included in our pesticide applicators annual pesticide application and safety training, continuing education programs, and/or regional NPDES Permit training programs.*

### **Descriptions of specific BMPs for each application mode, e.g. aerial, truck, hand, etc.**

*The District calibrates truck-mounted and handheld larviciding equipment each year to meet application specifications. Supervisors review application records daily to ensure appropriate amounts of material are being used. Ultra-low volume (ULV) application equipment is calibrated for output and droplet size to meet label requirements. Aerial adulticiding and larviciding equipment is calibrated by the Contractor. Aerial adulticide equipment is calibrated regularly and droplet size is periodically monitored by the District to ensure droplets meet label requirements. Airplanes used in urban ULV applications and the primary airplane used for rural ULV application is equipped with advanced guidance and drift management equipment to ensure the best available technology is being used to place product in the intended area. If a secondary airplane is used in rural ULV applications it will be equipped with an advanced guidance system.*

### **Descriptions of specific BMPS for each pesticide product used**

*Please see the Best Management Practices for Mosquito Control in California and appendix 2 for general pesticide application BMPs, and the current approved pesticide labels for*

*application BMPs for specific products.*

***Descriptions of specific BMPs for each type of environmental setting (agricultural, urban, and wetland):***

Specifically, employees will evaluate the ability of a given mosquito breeding source to be reduced or eliminated per biological and/or physical control strategies outlined in the District's IPM plan after determining: 1) the species of mosquito, 2) the immediate population of mosquitoes, and 3) the current public health threat posed by the mosquito specie(s), the current mosquito population, and related arbovirus activity. Additional information regarding arbovirus activity is also used in determining what type of control technique should be implemented and when.

10. Prior to the first pesticide application covered under the permit that will result in a discharge of biological and residual pesticides to waters of the U.S., and at least once each calendar year thereafter prior to the first pesticide application for that calendar year the District will do the following for each vector management area:

- Utilize densities for larval and adult vector populations identified in the District's IPM plan (item 2.f. above) for implementing pest management strategies;

The District utilizes the term "tolerance threshold" when determining if or when mosquito control should be implemented. Tolerance threshold is the population density of mosquitoes at which control measures should be implemented to prevent an increasing population from reaching an intolerable level. The data from sampling and monitoring is used to help decide at which infestation level to initiate control activities. This decision level is based on larval and adult mosquito populations, citizen complaints, and the potential for disease outbreaks, and the risk of control activities to non-target organisms.

Action levels are different for each situation. In some areas, a public health or general annoyance condition does not occur until the number of adult female mosquitoes exceeds 10 per trap night. Other action levels that have been used are landing rates averaging more than two mosquitoes in one minute, and dipper counts averaging 0.1 larvae per dip. Action levels for urban, suburban, and rural residential areas can be lower than for remote, uninhabited areas, or areas of low human use.

**Adult mosquito threshold(s)**

Adult mosquitoes are measured by the use of the three techniques identified in the section "Surveillance". Because the District operates the mosquito surveillance and control program year round, the tolerance threshold can be changed by many factors. Examples of the many factors that change the adult mosquito tolerance threshold are listed below:

- As weather conditions change in late fall and early winter, human activity in the outdoors is reduced, and arbovirus activity in the environment less important. Although the adult mosquito population is at or above a tolerance threshold for other conditions, the District may not implement certain control actions because the mosquito population will not create an annoyance or public health problem.
- Generally, adult mosquito control is implemented when populations of the encephalitis mosquito *Culex tarsalis* reach a level of 10 females per trap night. However, if encephalitis virus has been detected in humans, domestic animals, mosquito pools, dead birds or sentinel chicken flocks, the District may initiate adulticiding at a lower number of adult mosquitoes per trap night.

- High populations ( $\geq 10$  mosquitoes/trap night) of certain species, i.e., *Culex erythrothorax*, would not necessarily require control action if the population were found in a low human-use or remote area.

### **Immature mosquito threshold(s)**

Immature mosquitoes are generally measured by the use of the dipping technique identified in the section "Surveillance". Because the District operates the mosquito surveillance and control program year round, the tolerance threshold can be changed by many factors. Examples of the many factors that change the immature mosquito tolerance threshold are listed below:

- Although an immature mosquito population of 0.1 larvae per dip (one larvae in 10 dips) is not seen as a large problem with certain species, i.e., *Culiseta inornata*, in the winter months, it would be a significant public health risk for the species *Culex tarsalis* during the months of April through November.
- Relatively small populations of larvae ( $< 1$  larvae per dip) of the species *Culex pipiens* can be tolerated in a rural waste water impoundment, but would be unacceptable if found in a suburban area swimming pool.
- The larvae of the mosquito species *Aedes nigromaculis* can develop rapidly into more mature stages in warm weather, generally requiring immediate treatment with the use of a larvicide. Larvae of the species *Aedes sierrensis* can mature much slower, allowing for aspects of naturalistic control to be considered as a method of IPM.
- Utilize vector identification and surveillance techniques identified in the Best Management Practices for Mosquito Control in California (item 2.a. above), the California Mosquito-Borne Disease Surveillance and Response Plan (item 2.b. above), and the District's IPM plan (item 2.f. above) to identify vector species in the development of species-specific pest management strategies;

### **Monitoring immature mosquito populations**

Typically, the application of biological control agents and larvicides in locations where physical control is not an option is preferred to adulticiding. This procedure minimizes the area treated and the amount of resources (bio-control agents or chemicals) required. Because the District's mosquito control program utilizes several different types of control strategy, information and data regarding mosquito breeding sites and larval monitoring are collected. The District maintains a permanent record of each mosquito-breeding site, along with information on larval development found at each inspection.

Immature mosquitoes are sampled using a variety of methods and equipment. Mosquito larvae and pupae are collected with dippers, suction devices, and container evacuation methods. The most commonly used apparatus is the standard one-pint dipper, using standardized dipping techniques. The dipper is used as a survey tool simply to determine the presence of larvae. Standardized dipping methods are used when mosquito densities are to be quantified, usually in values taking additional dipper samples from specific areas in the habitat and counting the number of larvae in each dip. In most cases, the District's control program uses the measure of larval density as a basis for control action. Currently, the District utilizes a threshold value of 0.1 larvae per dip ( $\geq 1$  larvae in 10 dips) for consideration of a form of mosquito control, i.e., mosquitofish planting, larviciding, etc.

To maximize the usefulness of immature mosquito surveillance data, the District monitors certain environmental parameters such as rainfall and mountain snow pack. In certain areas of San Joaquin County, tide levels are also monitored. Rainfall and tide changes dictate when certain areas will need to be inspected for mosquito larvae. Mountain snow

pack levels can translate to adequate agriculture irrigation supplies and river flows capable of creating seepage problems.

### **Monitoring adult mosquito populations**

The District uses one or more methods to measure adult mosquito populations before a control decision is made. The two (2) methods used most often are landing/resting rates and mechanical trap counts. The purpose of monitoring adult mosquitoes is 1) to determine where adults are most numerous, 2) to substantiate telephone service request claims of a mosquito problem, 3) to provide data that satisfies District policy and state regulation for applying adulticides (e.g., the pest or vector must be present at the treatment site), and 4) to determine the effectiveness of different control methods.

Landing/resting rates are a frequently used method for measuring adult mosquito activity. For the mosquito genera *Aedes* and *Anopheles*, the landing rate technique comprises a count of the number of mosquitoes that land on a person in a given amount of time. Resting rates are a method of measuring the activity of *Culex*, and to a lesser degree, *Anopheles* and *Culiseta* species of mosquitoes. The quantity of adult mosquitoes found resting on walls, under eaves, in culverts and pipelines, and in dense vegetation is measured by area, i.e., the number of mosquitoes per square foot. The specific method used to determine landing or resting rates could vary. Important variables are the time of day at which observations are made, the length of time an observation is made, and the portion of body and/or number of sites examined. Emphasis is placed on using the same protocol at given sites, and to use the same inspector to assess landing or resting counts at the same site from one date to the next.

Mechanical traps are used extensively throughout the District on a continuous, year-round basis to monitor adult mosquito populations. Mechanical traps include the standard New Jersey-style light trap (NJLT), encephalitis virus surveillance (EVS) trap, baited Fay trap, and gravid trap.

- EVS traps are used at different times during the year. The traps are used to collect adult *Culex pipiens* and *Cx. tarsalis* mosquitoes for use as mosquito pools, which are either tested in the District's laboratory or sent to the CDPH Viral and Rickettsial Disease Laboratory for encephalitis virus detection. EVS traps are also used to assess pre- and post-treatment populations of adult mosquitoes to determine control effectiveness.
- Fay traps are used for special purpose monitoring, i.e., in the spring to measure localized populations of *Aedes sierrensis*.
- Gravid traps can be used to selectively sample gravid female mosquitoes that are seeking suitable oviposition sites and are generally used in urban and suburban settings where *Culex pipiens* have been detected.

### **Monitoring telephone service requests and resident complaints**

The third method of ascertaining a mosquito problem is through telephone and website service requests and resident complaints. The District maintains several different listed telephone numbers, including a toll-free line that residents and visitors can call to request mosquito control services; additionally, residents are encouraged to use District's website at [www.sjmosquito.org](http://www.sjmosquito.org) to seek assistance also. Service requests are also received at numerous community fairs where the District operates an information booth. The District responds to an average of 1,000 service requests per year.

Service requests generally are related to specific mosquito species, although the mosquitoes that cause service requests vary considerably from one area to the next. Telephone service requests and citizen complaints are always verified as to their validity

prior to any control action being implemented. District personnel substantiate mosquito activity by assessing larval and adult mosquito populations using the techniques described earlier.

- Utilize the District's GIS mosquito surveillance and control record keeping system (Sentinel) for the identification of known breeding areas for source reduction, larval control, and habitat management; *see Best Management Practices for Mosquito Control in California, June 2011: Executive Summary, page v., Section 3; Appendix A, page 26, Environmental Management; Appendix A, page 27, Biological Control; Appendix A, page 27, Chemical Control; see District IPM Plan, 2008: Combining and integrating control tactics, pages 6-7.*

*The following surface waters were identified as known breeding areas and will be analyzed for source reduction, larval control and habitat management prior to further chemical control applications (sources are identified per District zone designation, township, range, and section MDB&M; see attached District zone map for reference):*

ZONE	TFLD	RFLD	SFLD	XFLD	SOURCE#
01	4N	8E	05	2	01
01	4N	8E	08	10	01
01	4N	8E	08	10	01
01	4N	8E	08	10	01
01	4N	8E	08	10	01
01	5N	7E	36	4	02
01	5N	7E	36	4	02
02	5N	7E	34	3	04
02	5N	7E	34	3	04
02	5N	7E	34	3	04
03	4N	6E	08	1	02
03	4N	6E	16	4	02
03	4N	6E	16	4	02
03	5N	5E	28	3	04
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03
04	3N	5E	25	5	03

04	3N	5E	25	5	03
05	3N	6E	36	15	01
05	3N	6E	25	2	09
05	3N	6E	25	8	01
05	3N	6E	25	8	01
05	3N	6E	25	10	02
05	3N	6E	25	2	09
05	3N	6E	25	2	09
05	3N	6E	25	2	09
05	3N	6E	25	10	02
05	3N	6E	25	8	01
05	3N	6E	25	2	09
05	3N	7E	23	3	01
05	3N	7E	23	3	01
05	3N	7E	22	503	01
05	3N	7E	28	503	01
05	3N	7E	28	503	01
05	3N	7E	28	503	01
05	4N	6E	35	502	01
05	4N	6E	35	502	01
06	3N	7E	24	40	01
06	3N	7E	24	40	01
06	3N	7E	13	5	02
06	3N	7E	13	5	02
06	3N	7E	13	5	02
06	3N	7E	13	5	02
06	3N	7E	24	40	01
06	3N	7E	13	5	02
06	3N	7E	13	5	02
06	3N	7E	24	40	01
06	3N	7E	24	40	01
06	3N	7E	13	5	02
06	3N	7E	13	5	02
06	3N	7E	24	40	01
06	3N	7E	24	40	01
06	3N	7E	13	5	02
06	3N	7E	24	40	01
06	3N	7E	24	40	01
06	3N	7E	13	5	02
06	3N	7E	24	40	01
06	3N	7E	13	5	02
06	3N	8E	18	7	01
06	3N	8E	18	7	01

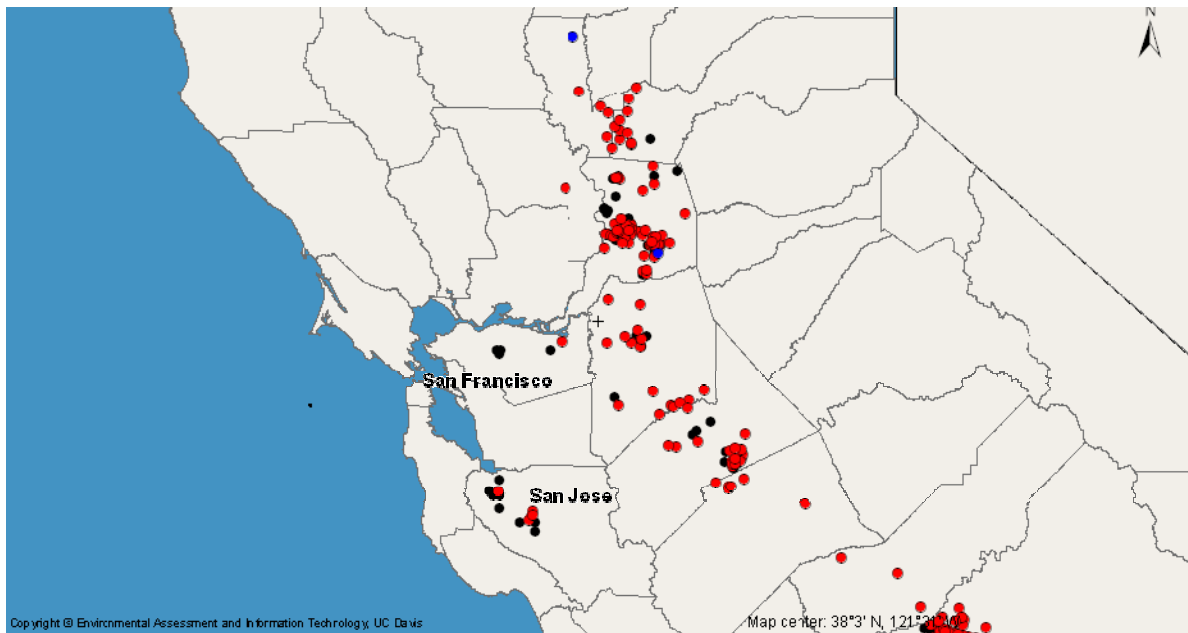
06	3N	8E	18	7	01
06	3N	8E	07	10	01
07	1N	9E	17	2	1
07	1N	9E	17	2	01
07	1N	9E	17	2	01
07	1N	9E	17	2	01
08	1N	7E	02	4	01
08	1N	7E	02	4	1
08	1N	7E	02	4	01
08	1N	7E	02	4	01
08	1N	7E	02	4	1
08	1N	7E	02	4	01
08	2N	6E	18	45354	1
08	2N	6E	07	4	01
08	2N	6E	09	5	01
08	2N	6E	08	5	01
08	2N	6E	09	5	01
08	2N	6E	08	5	01
08	2N	6E	07	4	1
08	2N	6E	16	500	1
08	2N	6E	17	500	1
08	2N	6E	16	500	1
08	2N	6E	16	500	01
08	2N	6E	16	500	01
08	2N	6E	09	5	01
08	2N	6E	16	500	01
08	2N	6E	16	500	1
08	2N	6E	17	500	1
08	2N	6E	09	5	01
08	2N	6E	09	5	01
08	2N	6E	08	5	01
08	2N	6E	08	5	01
08	2N	6E	16	500	01
08	2N	6E	17	500	01
10	1N	6E	11	45546	1
10	1N	7E	23	1	01
10	1N	7E	21	25	01
10	1N	7E	21	25	01
10	1N	7E	21	2	01
10	1N	7E	07	4	01
10	1N	7E	08	2	01
10	1N	7E	08	2	01
10	1N	7E	07	4	01
10	1N	7E	07	4	01



10	1N	7E	08	2	01
10	1N	7E	08	2	01
10	1N	7E	08	2	01
15	2S	5E	29	4	01
15	2S	6E	17	4	01
15	2S	6E	17	3	02
15	2S	6E	17	4	01
15	2S	6E	17	4	01
15	2S	6E	17	4	01
15	2S	6E	17	4	01
15	2S	6E	17	4	01
15	2S	6E	17	4	01
15	2S	6E	17	4	01
15	2S	6E	17	4	01

- Utilize the District’s GIS mosquito surveillance and control record keeping system (Sentinel), the University of California/CVEC Gateway system, and the California Department of Public Health’s data sets to analyze existing surveillance data for the identification of new or unidentified sources of vector problems as well as areas that may have recurring vector problems.

Following is an example of some of the West Nile virus surveillance information provided by the University of California, Center for Vector-Borne Disease (CVEC). The black, blue and red dots indicate the presence of virus activity in dead birds, mosquito pools (e.g. collections), and sentinel chicken flocks. The surveillance information is collected from local mosquito control agencies and the California Department of Public Health. The surveillance information provides real-time analysis of mosquito and arbovirus information that can be used to determine a mosquito control strategy.

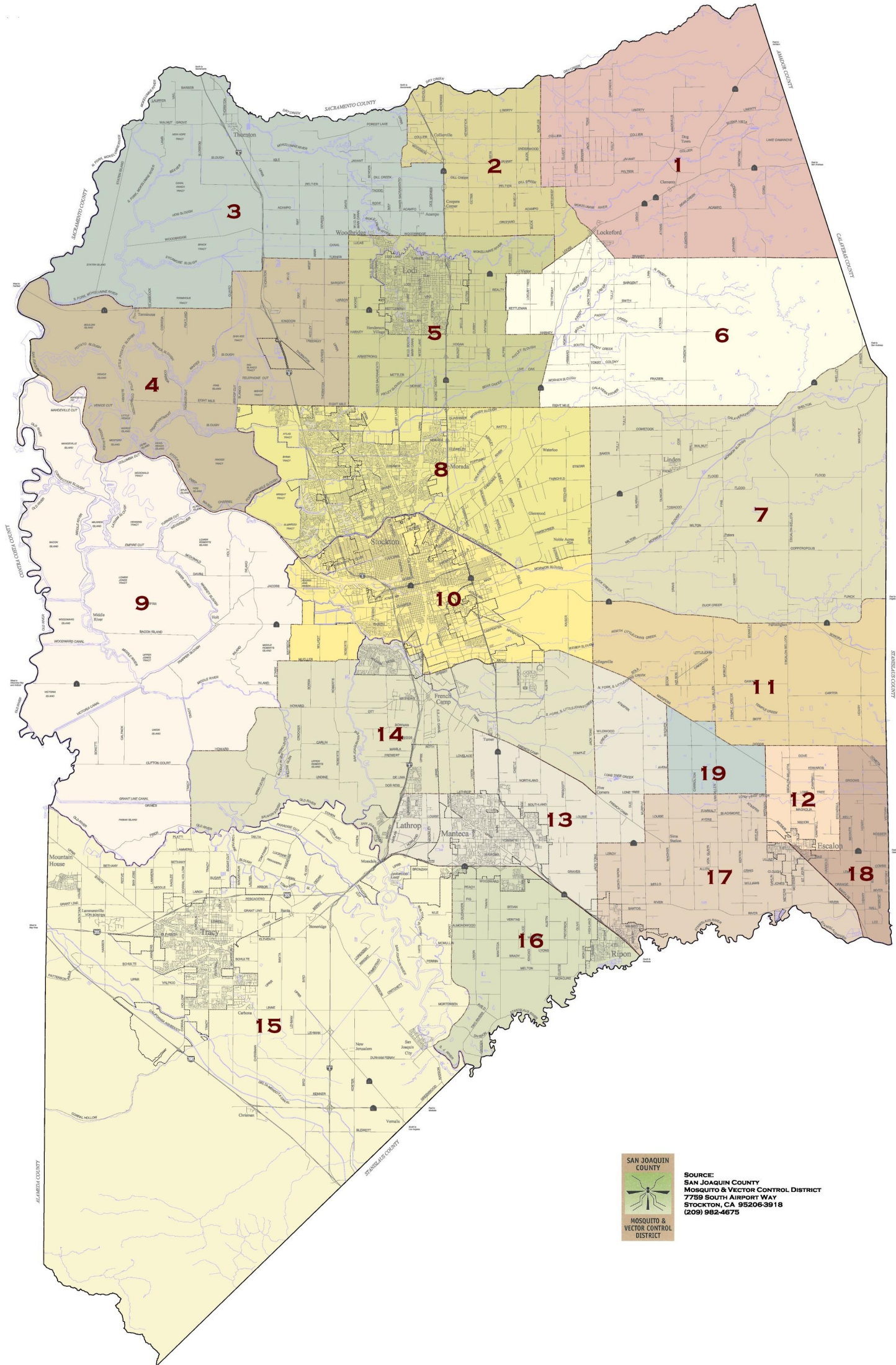


11. The District will utilize the resources identified in 2.a. through 2.g. (above) in the examination of alternatives to pesticides. If there are no alternatives to pesticides, the District, to the extent

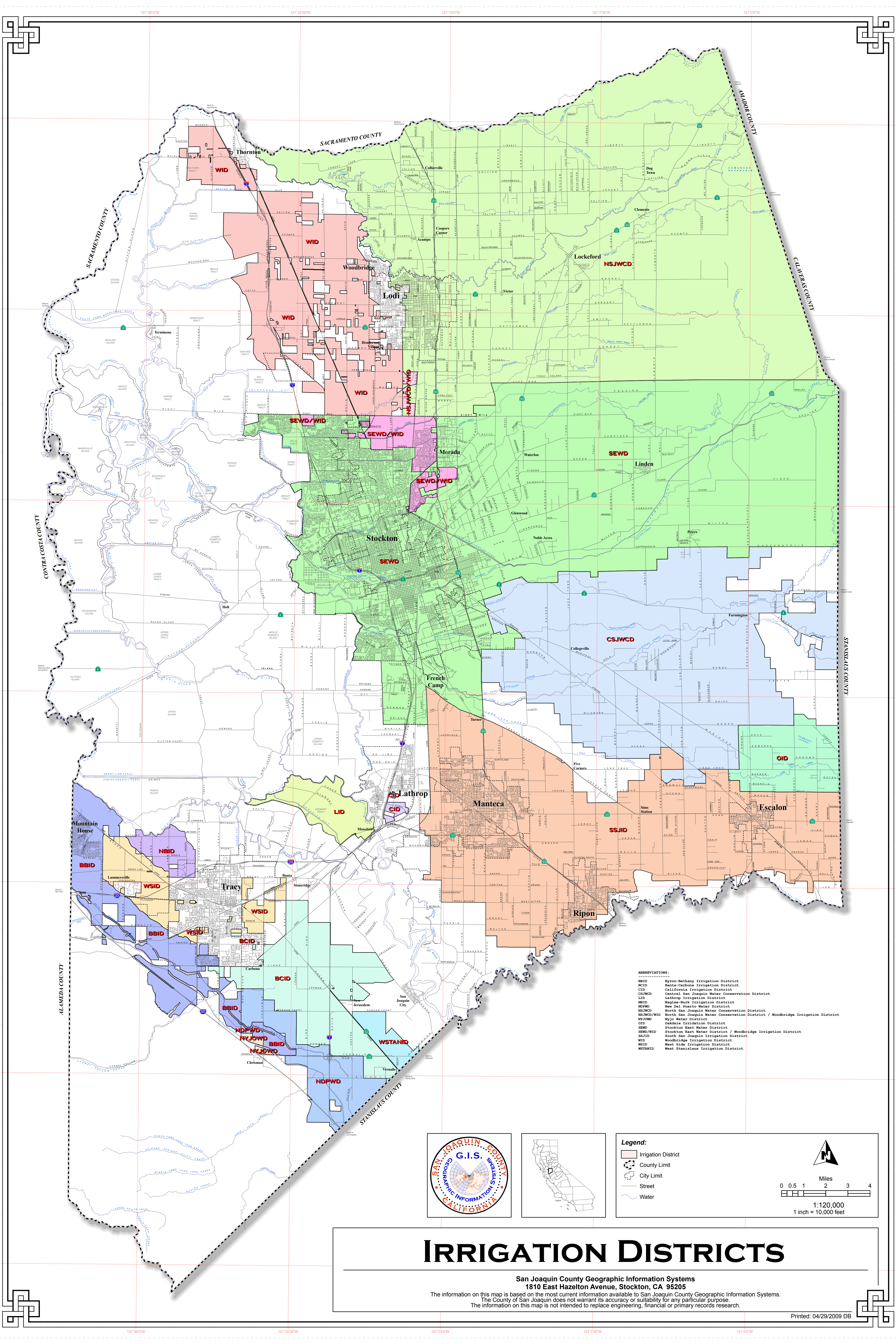
practical, will use the least amount of pesticide necessary to control the target pest, and will only apply pesticides when vectors are present at a levels identified in the IPM plan (item 2.f. above).

The District's interpretation of integrated pest management, referred to as IPM, is a sustainable approach, or plan, to managing public health pests and vectors, by combining biological, chemical, legal, natural and physical control tactics in a way that minimizes economic, health and environmental risks. IPM can also be considered as a systematic approach to public health pest management, which combines a variety of surveillance and control practices. For the purposes of the District's plan, a pest is defined as any organism that is unacceptably abundant. A vector is an organism (such as an insect or other arthropod) which 1) transports and transmits a parasite (including disease causing pathogens) from one host to another, 2) causes direct harm or injury without transmitting a parasite, or 3) causes significant annoyance to humans and/or animals. The words pest and vector are used interchangeably for the purposes of the District's surveillance and control plans for specific vectors.

12. The District will ensure that all reasonable precautions are taken to minimize the impacts caused by pesticide applications, and will comply with all regulations related to pesticide application, mixing, storing, and transport. The District is signatory to a cooperative agreement administered by the California Department of Public Health (copy attached) regarding pesticides, and agrees to: 1) calibrate all application equipment, 2) seek assistance from the County Agriculture Commissioner (CAC) for interpretation of pesticide labeling, 3) maintain records of each pesticide application for two or more years, 4) to submit monthly pesticide use reports to the CAC and CDPH-VBDS, 5) to report to the CAC and CDPH-VBDS any suspected adverse issues resulting from a pesticide application, 6) to certify and routinely train pesticide applicators, and 7) to be inspected by the CAC and the CDPH-VBDS to ensure that our activities are in compliance with laws and regulations related to pesticide application.
13. Public notices specified in Section VIII.B. of the permit will be posted on the District's website, [www.sjmosquito.org](http://www.sjmosquito.org).

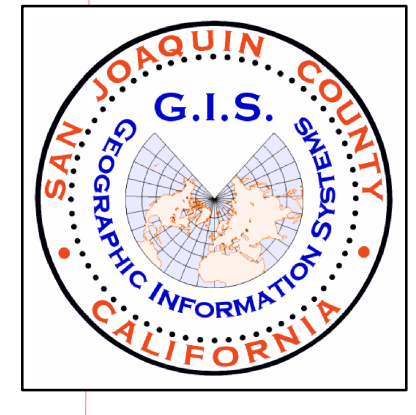


**SAN JOAQUIN COUNTY**  
**SOURCE:**  
**SAN JOAQUIN COUNTY**  
**MOSQUITO & VECTOR CONTROL DISTRICT**  
**7759 SOUTH AIRPORT WAY**  
**STOCKTON, CA 95206-3918**  
**(209) 982-4675**



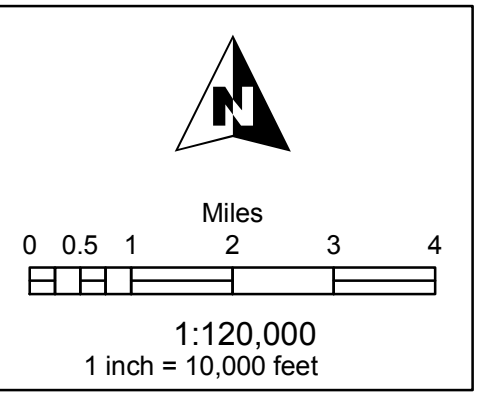
ABBREVIATIONS:

- BBID Byron-Bethany Irrigation District
- BCID Santa-Carbone Irrigation District
- CID California Irrigation District
- CSJWCD Central San Joaquin Water Conservation District
- LID Lathrop Irrigation District
- MBID Naples-Buck Irrigation District
- NSJWCD New Sal. Puerto Water District
- NSJWCD North San Joaquin Water Conservation District
- NSJWCD/WID North San Joaquin Water Conservation District / Woodbridge Irrigation District
- NSJWCD/WID Ryde Water District
- OID Oakdale Irrigation District
- SEWD Stockton East Water District
- SEWD/WID Stockton East Water District / Woodbridge Irrigation District
- SSJID South San Joaquin Irrigation District
- WID Woodbridge Irrigation District
- WSTAND West Side Irrigation District
- WSTAND West Stanislaus Irrigation District



**Legend:**

- Irrigation District
- County Limit
- City Limit
- Street
- Water

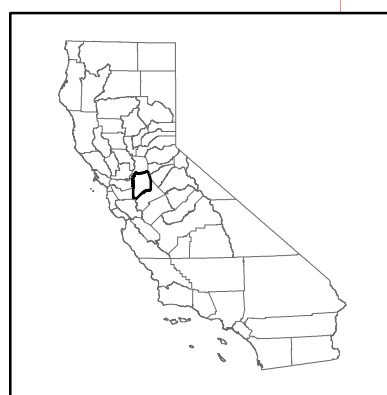
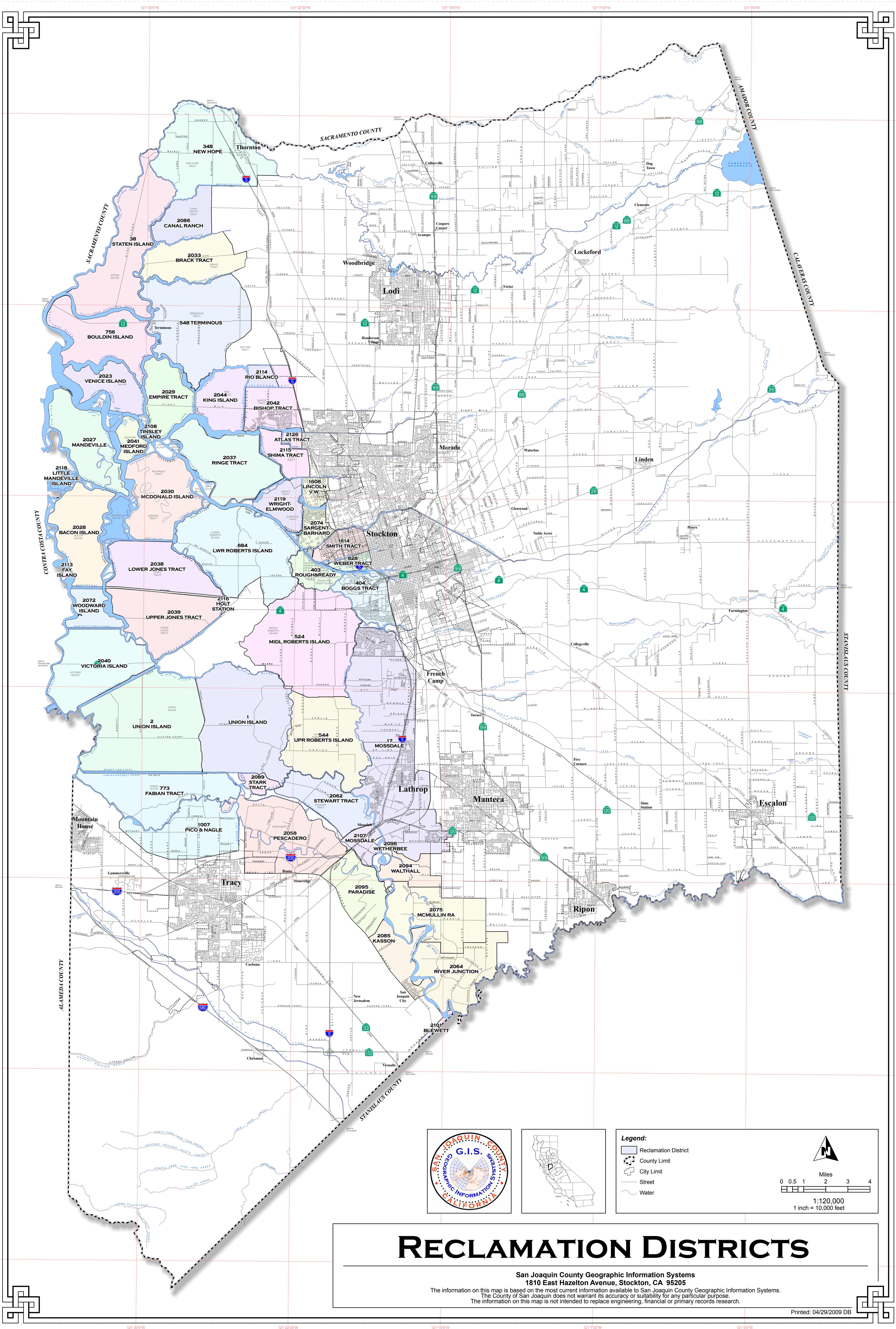


# IRRIGATION DISTRICTS

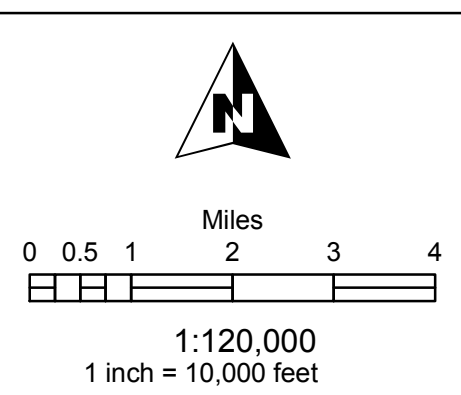
San Joaquin County Geographic Information Systems  
1810 East Hazelton Avenue, Stockton, CA 95205

The information on this map is based on the most current information available to San Joaquin County Geographic Information Systems. The County of San Joaquin does not warrant its accuracy or suitability for any particular purpose. The information on this map is not intended to replace engineering, financial or primary records research.

Printed: 04/29/2009 DB



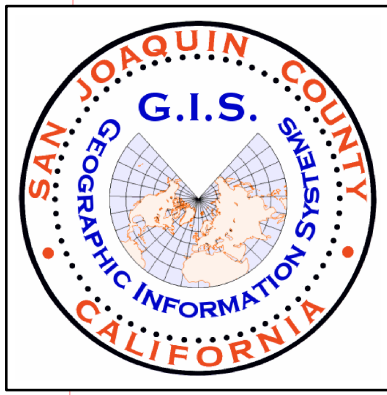
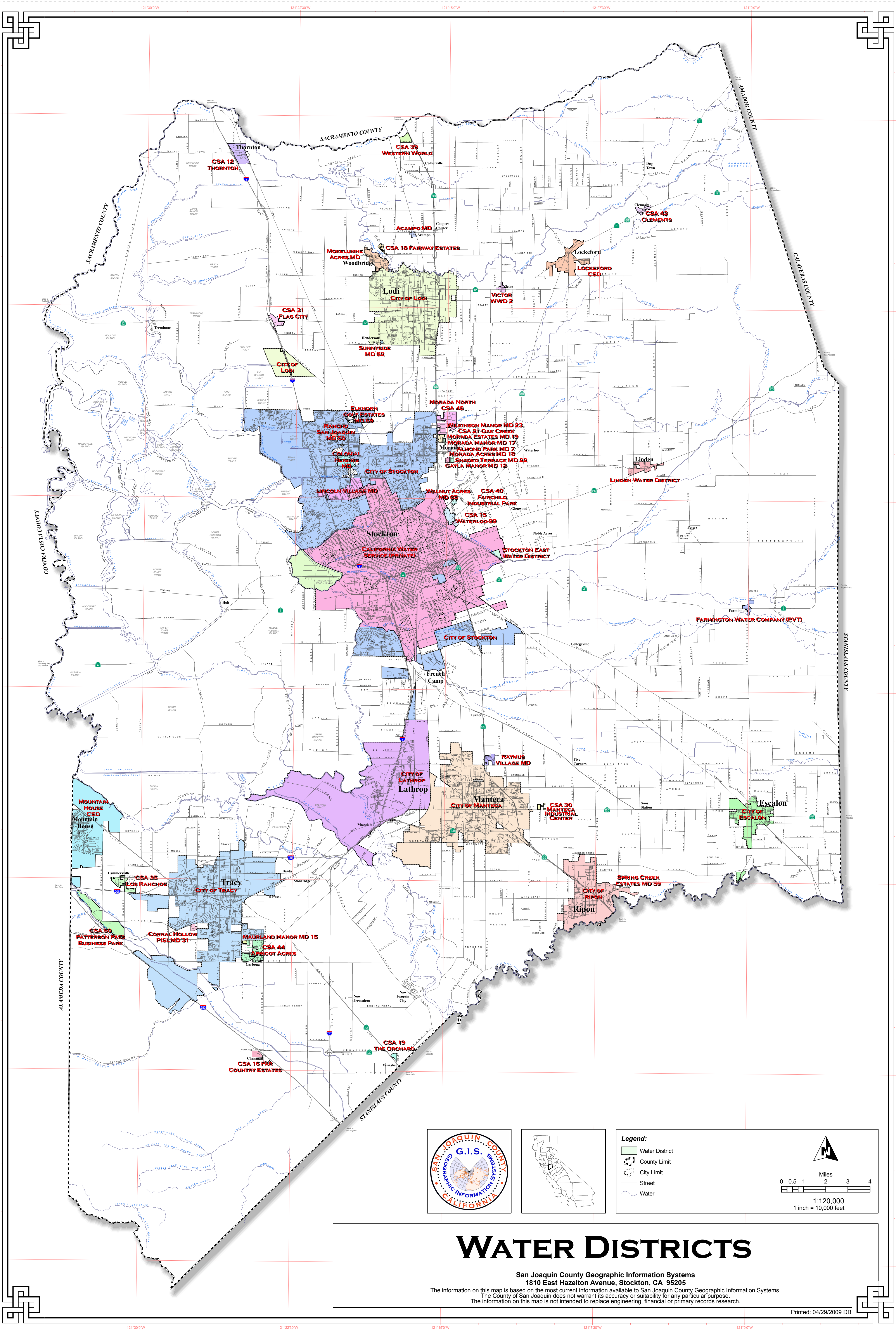
- Legend:**
- Reclamation District
  - County Limit
  - City Limit
  - Street
  - Water



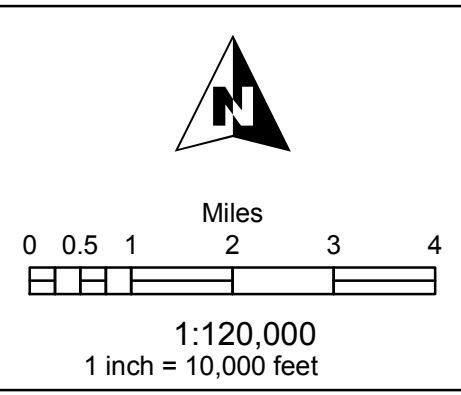
# RECLAMATION DISTRICTS

San Joaquin County Geographic Information Systems  
1810 East Hazelton Avenue, Stockton, CA 95205

The information on this map is based on the most current information available to San Joaquin County Geographic Information Systems. The County of San Joaquin does not warrant its accuracy or suitability for any particular purpose. The information on this map is not intended to replace engineering, financial or primary records research.



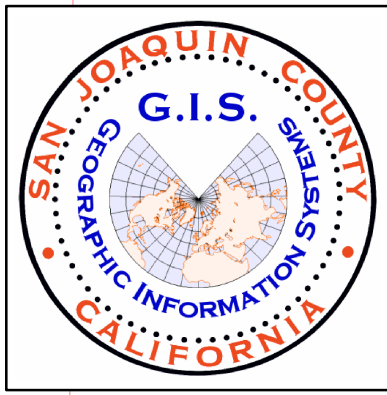
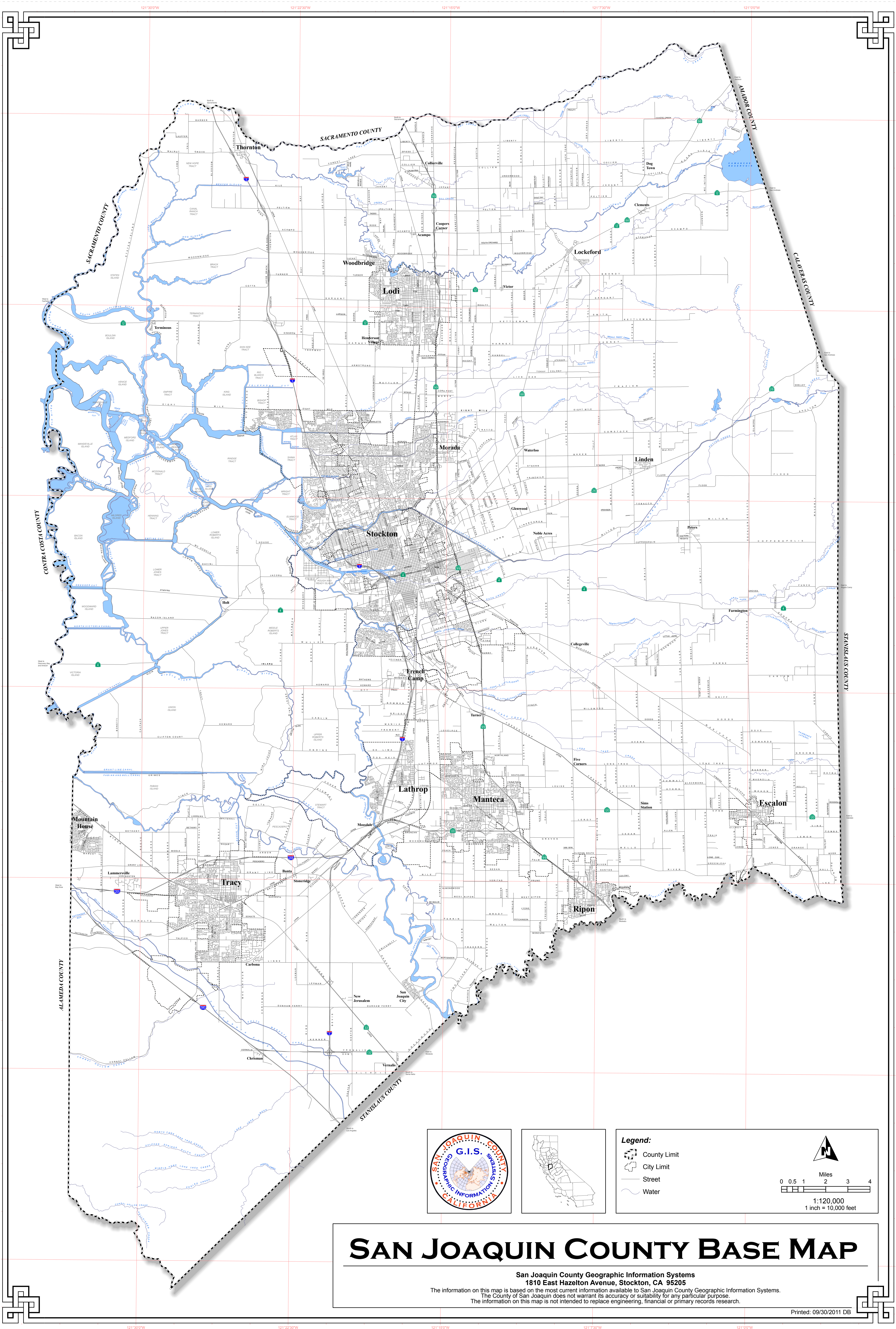
- Legend:**
- Water District
  - County Limit
  - City Limit
  - Street
  - Water



# WATER DISTRICTS

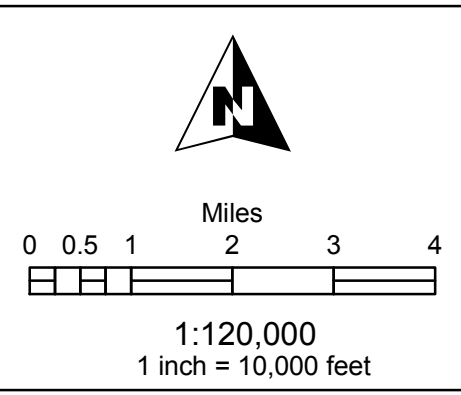
San Joaquin County Geographic Information Systems  
1810 East Hazelton Avenue, Stockton, CA 95205

The information on this map is based on the most current information available to San Joaquin County Geographic Information Systems. The County of San Joaquin does not warrant its accuracy or suitability for any particular purpose. The information on this map is not intended to replace engineering, financial or primary records research.



**Legend:**

- County Limit
- City Limit
- Street
- Water



# SAN JOAQUIN COUNTY BASE MAP

San Joaquin County Geographic Information Systems  
1810 East Hazelton Avenue, Stockton, CA 95205

The information on this map is based on the most current information available to San Joaquin County Geographic Information Systems. The County of San Joaquin does not warrant its accuracy or suitability for any particular purpose. The information on this map is not intended to replace engineering, financial or primary records research.