

National and State Resource Concerns and Quality Criteria					
Natural Resource Concern	Description of Concern	National Quality Criteria	California State Quality Criteria	Measurement Units	Assessment Tools for Quality Criteria Evaluation
WATER					
Water Quantity – Rangeland Hydrologic Cycle	The capacity to capture, store, and safely release water from rainfall, run-on, and snowmelt (where relevant).	Indicators of Rangeland Health Attribute rating for Hydrologic Cycle is Slight to Moderate or less departure from Ecological Reference Sheet (ESD).	Same as National	Departure from Ecological Reference Sheet (ESD) categories – amount of departure, by numeric value, from Ecological Reference Sheet for the field or planning area/unit. 1=None to Slight, 2=Slight to Moderate, 3=Moderate, 4=Moderate to Extreme, or 5=Extreme.	<ul style="list-style-type: none"> Interpreting Indicators of Rangeland Health (11)
Water Quantity - Excessive Seepage	Subsurface water oozing to the surface restricts land use and management.	Subsurface water is managed to limit periods of saturation that are unfavorable to the present or intended land use. Management complies with wetland policies.	Water does not restrict suitable land use and does not restrict operational activities. The desired land use does not require management or maintenance more extensive than on the remaining treatment unit.	Acres/Year – average annual acres of seep reduced for the field or planning area/unit	<ul style="list-style-type: none"> Visual Assessment (physical presence of water, prevalence of hydrophytic vegetation, etc.) Client interview Area measurements Soil Survey (1)

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Water Quantity - Excessive Runoff, Flooding, or Ponding	The land becomes inundated, restricting land use and management.	Excess water amounts and/or rates of flow are controlled, consistent with desired present or intended land use goals and wetland policies.	No unacceptable damage to land, crops, or structures from overland flow or standing water following a 2-year, 24-hour event.	Non Measurable	<ul style="list-style-type: none"> • Visual assessment • Client interview • Stream Visual Assessment Protocol (2) • National Engineering Handbook (EFH – chapter 2 and 3) (3) • Hydrologic models, e.g. HECRAS (4), TR-20, TR-55 (3)
Water Quantity - Excessive Subsurface Water	Water saturates upper soil layers, restricting land use and management.	Subsurface water is managed to limit periods of saturation compatible with the present or intended land use and wetland policies.	Same as National	Non Measurable	<ul style="list-style-type: none"> • Visual assessment of soil cores and coring holes • Plant quality and quantity measurements • National Engineering Handbook, Part 650 (EFH-Chapter 14) (3) • Soil Survey (1) • DrainMod (5)
Water Quantity - Drifted Snow	Wind-blown snow forms deposits and accumulates around and over surface structures, restricting ingress, egress and conveyance of humans and animals.	Snowdrifts are reduced or prevented so as to allow ingress, egress, and conveyance of humans and animals.	Same as National	Non Measurable	<ul style="list-style-type: none"> • Visual assessment • Client interview • Depth and area measurements

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Water Quantity - Inadequate Outlets	Natural or constructed outlets are too small to remove excess water in a timely manner.	Outlets are designed, installed, upgraded or maintained to adequately convey water for present or intended uses.	Same as National	Non Measurable	<ul style="list-style-type: none"> • Visual assessment • Client interview • National Engineering Handbook, part 650 (EFH – Chapters 2,3,7) (3) • Hydrologic models, e.g. HECRAS (4), TR-20, TR-55 (3)
Water Quantity - Inefficient Water Use on Irrigated Land	Limited water supplies are not optimally utilized.	Land and water management is planned and coordinated to provide optimal use of natural and applied moisture.	Considering farm economics and available technology, the current irrigation method shall be the most appropriate for the crops, soils, topography and climate. The irrigator has adequate control of the frequency, rate and duration of water application to each field. Irrigation timing and amount decisions are planned to replace depleted soil moisture (or the amount consumed by the crop) and applying a determined amount of water for salt leaching. Irrigation runoff or tail water is re-used beneficially.	Acre-Inches/Acre/Year – average annual acre-inches of water per acre used more beneficially for the field or planning area/unit	<ul style="list-style-type: none"> • Visual assessment • National Engineering Handbook, Part 652, Irrigation Guide (3) • Crop quality and quantity measurements • Farm Irrigation Rating Index (FIRI) (6) • Irrigation Enhancement Index (used in CSP)

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Water Quantity - Inefficient Water Use on Non-irrigated Land	Natural moisture is not optimally utilized.	Management provides optimum use of natural moisture for the present or intended land use.	Vegetation, cropping sequences, and cultural operations are managed for efficient use of precipitation by minimizing water losses to runoff and evaporation, thereby inducing positive effects on the plant-soil-moisture relationship, on groundwater recharge, and on water yield downstream.	Acre-Inches/Acre/Year – average annual acre-inches of water per acre used more beneficially for the field or planning area/unit	<ul style="list-style-type: none"> • Visual assessment • Plant or animal quality and quantity measurements • Soil Moisture Test
Water Quantity - Reduced Capacity of Conveyances by Sediment Deposition	Sediment deposits in ditches, canals, culverts, and other water conveyances reduce the desired flow capacity.	Conveyance structures are upgraded or maintained to adequately convey water for present or intended uses.	Designed flow capacity is maintained and sediment source areas treated to acceptable levels so they minimally contribute to sediment deposition problems.	Cubic yards – volume of sediment in cubic yards removed to maintain water conveyances for the field or planning area/unit	<ul style="list-style-type: none"> • Visual assessment • Client interview • National Engineering Handbook, Part 650 (EFH – Chapters 2,3,7) (3) • Hydrologic models, e.g., HECRAS (4), TR-20, TR-55 (3) • Measurements of loss of capacity

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Water Quantity - Reduced Storage of Water Bodies by Sediment Accumulation	Sediment deposits in water bodies reduce the desired volume capacity.	Water bodies and contributing source areas are treated to allow sufficient water storage for present and intended uses.	Sediment source areas are treated to acceptable levels to minimize contributions to the identified problem.	Acre-Inches/Year – average annual reduction in acre-inches in sediment deposition within water bodies for the field or planning area/unit	<ul style="list-style-type: none"> • Visual assessment • Depth and area measurements • National Engineering Handbook, Part 650 (EFH – Chapters 2,3,7,11) (3)
Water Quantity - Aquifer Overdraft	Water withdrawals exceed the safe yield for the aquifer.	Land and water management are coordinated to balance aquifer recharge and withdrawals to maintain the safe yield for the aquifer.	Same as National	Acre-Inches/Year – average annual reduction in acre-inches of groundwater overdraft for the field or planning area/unit	<ul style="list-style-type: none"> • Water level measurements
Water Quantity – Insufficient Flows in Water Courses	Water flows are not consistently available in sufficient quantities to support ecological processes and land use and management.	Authorized uses and management of water are coordinated to minimize the impacts on water course flows.	Same as National	Non Measurable	<ul style="list-style-type: none"> • Visual assessment • Water flow records • Gauge Station data • Consumptive use/allocation water rights • Habitat Evaluation Guides • National Biology Handbook

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Water Quality - Harmful Levels of Pesticides in Groundwater	Residues resulting from the use of pest control chemicals degrade groundwater quality.	Pesticides are applied, stored, handled, disposed of, and managed so that groundwater uses are not adversely affected	Farming practices, including irrigation water management, minimize the transport of pesticides.	Non Measurable	<ul style="list-style-type: none"> • WIN-PST (Windows Pesticide Screening Tool—USDA/NRCS) (7) • NAPRA (National Agricultural Pesticide Risk Analysis – USDA/NRCS) (7) • Vadose zone and groundwater chemical sampling and assay • Water Quality Index Tool (used in CSP)
Water Quality - Excessive Nutrients and Organics in Groundwater	Pollution from natural or human induced nutrients such as N, P, S (including animal and other wastes) degrades groundwater quality.	Nutrients and organics are stored, handled, disposed of, and applied so that groundwater uses are not adversely affected.	Farming practices, including irrigation water management, minimize the transport of nutrients and organics.	Non Measurable	<ul style="list-style-type: none"> • National Engineering Handbook, Part 651, Ag. Waste Mgt. Field Handbook (3) • NLEAP (8) • Farm*A*Syst (9) • Vadose zone and groundwater chemical/particle sampling and assay • Water Quality Index Tool (used in CSP)
Water Quality - Excessive Salinity in Groundwater	Pollution from salts such as Ca, Mg, Na, K, HCO ₃ , CO ₃ , Cl, and SO ₄ degrades groundwater quality.	Salts are stored, handled, disposed of, applied, and managed so that groundwater uses are not adversely affected.	Same as National	Electroconductivity (EC) – average reduction in EC for the field or planning area/unit	<ul style="list-style-type: none"> • Vadose zone and groundwater salinity sampling (total dissolved solids [TDS] or electrical conductivity) and assay • National Engineering Handbook, Part 652, Irrigation Guide (3) • Soil salinity sampling and assay • Water sampling • Water Quality Index Tool (used in CSP)

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Water Quality - Harmful Levels of Heavy Metals in Groundwater	Natural or human induced metal pollutants present in toxic amounts degrade groundwater quality.	Materials containing heavy metals are stored, handled, disposed of, applied, and managed so that groundwater uses are not adversely affected.	Alternatives reduce or eliminate contributions to groundwater of heavy metals exceeding allowable standards established by appropriate regulations..	Non Measurable	<ul style="list-style-type: none"> Vadose zone and groundwater chemical sampling and assay
Water Quality - Harmful Levels of Pathogens in Groundwater	Kinds and numbers of viruses, protozoa, and bacteria are present at a level that degrades groundwater quality.	Materials that harbor pathogens are stored, handled, disposed of, applied, and managed so that groundwater uses are not adversely affected.	Alternatives reduce or eliminate contributions of pathogens exceeding allowable standards established by appropriate regulations.	Non Measurable	<ul style="list-style-type: none"> Vadose zone and groundwater chemical sampling and assay
Water Quality - Harmful Levels of Petroleum in Groundwater	Fuel oil, gasoline, and other hydrocarbons present in toxic amounts degrade groundwater quality.	Petroleum products are used, stored, handled, disposed of, and managed so that groundwater uses are not adversely affected.	Same as National	Non Measurable	<ul style="list-style-type: none"> Vadose zone and groundwater chemical sampling and assay

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Water Quality - Harmful Levels of Pesticides in Surface Water	Pest control chemicals present in toxic amounts degrade surface water quality.	Pesticides are applied, stored, handled, disposed of, and managed so that surface water uses are not adversely affected.	The amount of pesticides leaving the targeted area is minimized or eliminated and does not exceed established standards from federal, state, or local criteria.	Non Measurable	<ul style="list-style-type: none"> • WIN-PST (Windows Pesticide Screening Tool-USDA/NRCS) (7) • NAPRA (National Agricultural Pesticide Risk Analysis – USDA/NRCS) (7) • Surface water chemical sampling assay • Water Quality Index Tool (used in CSP)
Water Quality - Excessive Nutrients and Organics in Surface Water	Pollution from natural or human induced nutrients such as N, P, S (Including animal and other wastes) degrades surface water quality.	Nutrients and organics are stored, handled, disposed of, and managed so that surface water uses are not adversely affected.	The amount of nutrients/organic material leaving the treated area is minimized or eliminated and does not exceed standards from federal, state, or local criteria.	Non Measurable	<ul style="list-style-type: none"> • SVAP (Stream Visual Assessment Protocol – USDA/NRCS) (2) • P index (7) • National Engineering Handbook, Part 651, Ag. Waste Mgt. Field Handbook (3) • Surface water chemical/particle sampling and assay • Water Quality Index Tool (used in CSP)
Water Quality - Excessive Suspended Sediment and Turbidity in Surface Water	Excessive concentrations of mineral or organic particles, algae, or organic stains degrade surface water quality.	Delivery or suspension of mineral and organic particles, and excessive algae growth or organic stains, is managed such that surface water uses are not adversely affected.	Suspended sediments leaving the site are minimized and do not exceed standards from federal, state, or local criteria. Factors including all farming practices contributing to turbidity in the area of concern will be minimized.	Non Measurable	<ul style="list-style-type: none"> • Visual assessment • Client interview • SVAP (Stream Visual Assessment Protocol – USDA/NRCS) (2) • Water Quality Indicators Guide – Surface Waters, Field Sheets IA and 1B (Terrene Institute ©1996) • Surface water chemical/particle sampling and assay • Water Quality Index Tool (used in CSP)

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Water Quality - Harmful Levels of Heavy Metals in Surface Water	Natural or human induced metal pollutants are present in toxic amounts that degrade surface water quality.	Materials containing heavy metals are stored, handled, disposed of, applied, and managed so that surface water uses are not adversely affected.	Same as National	Non Measurable	<ul style="list-style-type: none"> Surface water chemical sampling and assay
Water Quality - Harmful Temperatures of Surface Water	Undesired thermal conditions degrade surface water quality.	Use and management of land and water are coordinated to minimize impacts on surface water temperatures.	Water temperatures will be suitable for the intended uses and meet or exceed criteria established by federal, state, or local regulations.	Non Measurable	<ul style="list-style-type: none"> SVAP (Stream Visual Assessment Protocol – USDA/NRCS) (2)– canopy cover HSI model for target species (Habitat Suitability Index – USF&WS) (10) Surface water temperature sampling and assay
Water Quality - Harmful Levels of Pathogens in Surface Water	Kinds and numbers of viruses, protozoa, and bacteria are present at a level that degrades surface water quality.	Materials that harbor pathogens are stored, handled, disposed of, applied, and managed so that surface water uses are not adversely affected.	Pathogens reaching a surface water body do not exceed allowable criteria established by federal, state, and local regulations.	Non Measurable	<ul style="list-style-type: none"> Surface water pathogen sampling and assay

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FOOTNOTES

- (1) Soil Survey: <http://www.ca.nrcs.usda.gov/mlra02/>
- (2) Stream Visual Assessment Protocol: <ftp.wcc.nrcs.usda.gov/downloads/wqam/svapfnl.pdf>
- (3) NRCS Engineering References: www.info.usda.gov/CED
- (4) HecRas: www.hec.usace.army.mil/software/hecras/hecras-hecras.html
- (5) DrainMod: http://www.wsi.nrcs.usda.gov/products/W2Q/water_mgt/Drainage/DRAINMOD.html
- (6) Farm Irrigation Rating Index: www.id.nrcs.usda.gov/technical/engineering/engdwnld.html
- (7) WinPST: http://www.wsi.nrcs.usda.gov/products/W2Q/pest/pest_mgt.html
- (8) NLEAP: <http://www.ars.usda.gov/Business/docs.htm?docid=6346>
- (9) Farm*A*Syst: www.uwex.edu/farmasyst/
- (10) Habitat Suitability Index: www.fws.gov
- (11) USDI and USDA. Interpreting Indicators of Rangeland Health, version 4, Technical Reference 1734-6, 2005. <http://www.glti.nrcs.usda.gov/technical/publications/index.html#range-health-indicate> Also refer to the Ecological Site Descriptions.