Mid Snake River/Succor Creek Subbasin Assessment and Total Maximum Daily Load

April 2003

Water Body	Segment ID and AU	Boundaries	Listing Basis[2]	Pollutants
Jump Creek	2673 005_02,03	Headwaters to Snake River	SSOC Basin Status Report	Habitat alteration
McBride Creek	2672 004_02,03	Headwaters to Oregon Line	305 (b) app. D	Flow alteration, sediment, temperature
North Fork Castle Creek	2680 014_02a	Headwaters to Castle Creek	Added by EPA	Temperature
Pickett Creek	26810 16_02, 03	T5SR1WS32 to Catherine Creek	305(b)	Sediment
Pickett Creek	6681 016_02	Headwaters to T5SR1WS32	305(b)	Flow alteration, sediment, temperature
Poison Creek[3]	2687 006_02, 03	Headwaters to Shoofly Creek	305(b)	Sediment
Rabbit Creek	2677 026_02	Headwaters to Snake River	Idaho Rivers United (IRU)	Sediment
Reynolds Creek	2676 009_04	Diversion to Snake River	IRU	Sediment
Sinker Creek	2679 006_03	Diamond Creek to Snake River	305(b)	Flow alteration, sediment, temperature
South Fork Castle Creek	2683 014_02	Headwaters to Castle Creek	305 (b) app. D BLM	Bacteria
Squaw Creek	2674 007_02, 03	Headwaters to Snake River	Added by EPA	Temperature
Squaw Creek	2674 007_03	Unnamed tributary 3.9 km upstream of river to Snake River	Public Comment DEQ Temp Study	Sediment, temperature
Succor Creek	2671 002_04	Oregon line to Snake River.	305(b)	Sediment
Succor Creek	6671 002_02, 03	Headwaters to Oregon line	305(b)	Flow alteration, sediment, temperature

[1]Refers to a list created by the State of Idaho in 1998. Monitoring data were used to identify water bodies in Idaho that did not fully support at least one beneficial use. This list is required under section 303subsection "d" of the Clean Water Act.

[2]These are the state, federal or private actions that resulted in the stream being placed on the 303(d) list.

[3]Poison Creek appears on the 303(d) list under HUC 17050103. This is a mistake. The Poison Creek that is in HUC 17050103 is not 303(d) listed. However, Poison Creek is evaluated as part of this subbasin assessment

2.2 Applicable Water Quality Standards

Idaho adopts both narrative and numeric water quality standards to protect public health and welfare, enhance the quality of water, and protect biological integrity. By designating the beneficial use or uses for water bodies, Idaho has created a mechanism for setting criteria necessary to protect those uses and prevent degradation of water quality through anti-degradation provisions. According to IDAPA 58.01.02.050 (02)a "wherever attainable, surface waters of the state shall be protected for beneficial uses which includes all recreational use in and on the water surface and the preservation and propagation of desirable species of aquatic biota." Beneficial use support is determined by DEQ through its water body assessment process. Table 5 contains a listing of the designated beneficial uses for each listed segment. Table 6 is a summary of the water quality standards associated with the beneficial uses. For streams with no designated beneficial uses, cold water aquatic life and recreation are presumed to be uses. The following discussion focuses on beneficial uses and the water quality criteria, both narrative and numeric, that apply to each of the listed water bodies. A more detailed explanation of the numeric water quality targets developed as an interpretation of the narrative standards for nutrients and sediment can be found in the Water Quality Targets section of this TMDL.

Table 5. Mid Snake River/Succor Creek Subbasin Designated Beneficial Uses

Water Body	Designated Uses[1]	1998 §303(d) List[2]
Snake River: CJ Strike Dam to Castle Creek	CW PCR, DWS, SRW[3]	Sediment
Snake River: Castle Creek to Swan Falls Dam	CW, PCR, DWS	Sediment
Snake River: Swan Falls Dam Idaho/Oregon Border	CW, PCR, DWS	Bacteria, dissolved oxygen, flow alteration, nutrients, pH, sediment
Birch Creek	No designated uses	Sediment
Brown Creek	No designated uses	Sediment, temperature
Castle Creek	CW, SS, PCR	Temperature, sediment, flow alteration
Corder Creek	No designated uses	Sediment
Cottonwood Creek	No designated uses	Temperature
Hardtrigger Creek	No designated uses	Sediment
Jump Creek	CW, PCR	Habitat alteration
McBride Creek	No designated uses	Flow alteration, sediment, temperature
North Fork Castle Creek	No designated uses	Temperature
Pickett Creek	No designated uses	Sediment
Pickett Creek	No designated uses	Flow alteration, sediment, temperature
Rabbit Creek	No designated uses	Sediment
Reynolds Creek	CW, SS, PCR	Sediment
Sinker Creek	CW,SS, PCR	Flow alteration, sediment, temperature

Water Body	Designated Uses[1]	1998 §303(d) List[2]
South Fork Castle Creek	No designated uses	Bacteria
Squaw Creek	No designated uses	Sediment, temperature
Succor Creek (lower)	CW, SS, PCR	Sediment
Succor Creek (upper)	CW, SS, PCR	Flow alteration, sediment, temperature

[1]CW – Cold Water, SS – Salmonid Spawning, PCR – Primary Contact Recreation, SCR – Secondary Contact Recreation, AWS – Agricultural Water Supply, DWS – Domestic Water Supply

[2]Refers to a list created by the State of Idaho in 1998. Monitoring data was used to identify water bodies in Idaho that did not fully support at least one beneficial use. This list is required under section 303 subsection "d" of the Clean Water Act.

[3]Special Resource Water. A waters designated as a special resource water meets at least one of the following criteria: 1) outstanding quality for recreation and aquatic life; 2) unique ecological significance; 3) outstanding recreational or aesthetic qualities; 4) protection is paramount to the interest of the people in Idaho; 5) within a wild and scenic river system, state or national park system or wildlife refuge; and 6) intensive protection is necessary to maintain an existing, but jeopardized beneficial use.

Table 6. Water Quality Standards Associated with Beneficial Uses

Pollutant & IDAPA Citation	Beneficial Use(s) to Which Standard Applies	Applicable Water Quality Standard
Temperature (58.01.02.250.02.b)	Cold Water Aquatic Life	No greater than 22 degrees Celsius AND no greater than 19 degrees Celsius maximum daily average
(58.01.02.250.02.e.ii)	Salmonid Spawning	During salmonid spawning periods: no greater than 13 degrees Celsius AND no greater than 9 degrees Celsius maximum daily average
Dissolved Oxygen (58.01.02.250.02.a)	Cold Water Aquatic Life Salmonid Spawning	Greater than 6.0 mg/L except in hypolimnion of stratified lakes and reservoirs
Sediment (58.01.02.200.08)	Cold Water Aquatic Life Salmonid Spawning	Sediment shall not exceed quantities specified in general surface water quality criteria (IDAPA 58.01.02.250 or 252) or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses
Turbidity (58.01.02.250.02.d)	Cold Water Aquatic Life	Less than 50 NTU[2] above background for any given sample or less than 25 NTU for more than 10 consecutive days (below any applicable mixing zone set by DEQ)
Bacteria (58.01.02.251.01.b,c)	Contact Recreation	Less than 126 *E. coli* organisms/100 mL as a 30 day geometric mean with a minimum of five samples AND no sample greater than 406 *E. coli* organisms/100 mL

Floating, Suspended, or Submerged Matter (Nuisance Algae) (58.01.02.200.05)	Contact Recreation	Surface waters shall be free from floating, suspended, or submerged matter of any kind in concentration causing nuisance or objectionable conditions or that impair designated beneficial uses and be free from oxygen demanding materials in concentrations that would result in an anaerobic water condition
Excess Nutrients (58.01.02.200.06)	Cold Water Aquatic Life Contact Recreation	Surface waters shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses
pH (58.01.02.250.01.a)	Cold Water Aquatic Life	Hydrogen ion concentration (pH) values within the range of 6.5 to 9.0

[1]NTU = nephlometric turbidity unit

It is DEQ's position that habitat modification and flow alteration, which may adversely affect beneficial uses, are not pollutants under Section 303(d) of the CWA. Idaho has no water quality standards for habitat or flow, nor are they suitable for estimation of load capacity or load allocations. Because of these practical limitations, TMDLs will not be developed to address habitat modification or flow alteration.

Additionally, the CWA states that "TMDLs are required to be established for water bodies impaired by a pollutant, but not by pollution." EPA goes on to say that "EPA does not believe that flow, or lack of flow, is a pollutant as defined by CWA Section 502(6)."

Beneficial Uses

Surface water beneficial use classifications are intended to protect the various uses of the state's surface waters. Idaho water bodies that have designated beneficial uses are listed in the *Idaho Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 58.01.02). They are comprised of five categories: aquatic life, recreation, water supply, wildlife habitat, and aesthetics.

Aquatic life classifications are for water bodies that are suitable or intended to be made suitable for protection and maintenance of viable communities of aquatic organisms. Aquatic life beneficial uses include cold water, warm water, seasonal cold water, modified, and salmonid spawning.

Recreation classifications are for water bodies that are suitable or intended to be made suitable for primary and secondary contact recreation. Primary contact recreation is prolonged and intimate human contact with water where ingestion is likely to occur, such as swimming, water skiing, and skin diving. Secondary contact recreation consists of recreational uses where raw water ingestion is not probable, such as wading and boating.

Water supply classifications are for water bodies that are suitable or intended to be made suitable for agriculture, domestic, and industrial uses. Industrial water supply applies to all waters of the state. Wildlife habitat waters are those that are suitable or intended to be made suitable for wildlife habitat. Aesthetics is a use that applies to all waters of the state.

IDAPA 58.01.02.140 designates beneficial uses for selected water bodies in the Southwest Idaho Basin. Undesignated water bodies are presumed to support cold water biota and primary or secondary contact recreation unless DEQ determines that other uses are appropriate. This is typically done by preparing a detailed evaluation of the attainability of uses in the stream.

Idaho water quality standards require that surface waters of the state be protected for beneficial uses, wherever attainable (IDAPA 58.01.02.050.02). These beneficial uses are interpreted as existing uses, designated uses, and "presumed" uses as briefly described in the following paragraphs. The *Water Body Assessment Guidance*, second edition (Grafe et al. 2002) gives a more detailed description of beneficial use identification for use assessment purposes.

Existing Uses

Existing uses under the CWA are "those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards." The existing in-stream water uses and the level of water quality necessary to protect the uses shall be maintained and protected (IDAPA 58.01.02.003.35, .050.02, and 051.01 and .053). Existing uses include uses actually occurring, whether or not the level of quality to fully support the uses exists. Practical application of this concept would be when a water could support salmonid spawning, but salmonid spawning is not yet occurring.

Designated Uses

Designated uses under the CWA are "those uses specified in water quality standards for each water body or segment, whether or not they are being attained." Designated uses are simply uses officially recognized by the state. In Idaho these include things like aquatic life support, recreation in and on the water, domestic water supply, and agricultural use. Water quality must be sufficiently maintained to meet the most sensitive use. Designated uses may be added or removed using specific procedures provided for in state law, but the effect must not be to preclude protection of an existing higher quality use such as cold water aquatic life or salmonid spawning. Designated uses are specifically listed for water bodies in Idaho in tables in the Idaho water quality standards (see IDAPA 58.01.02.003.22 and .100, and IDAPA 58.01.02.109-160 in addition to citations for existing uses).

Presumed Uses

In Idaho, most water bodies listed in the tables of designated uses in the water quality standards do not yet have specific use designations. These undesignated uses are to be designated. In the interim, and absent information on existing uses, DEQ presumes that most waters in the state will support cold water aquatic life and either primary or secondary contact recreation (IDAPA 58.01.02.101.01). To protect these so-called "presumed uses," DEQ will apply the numeric cold water and primary or secondary contact recreation criteria to undesignated waters. If in addition to these presumed uses, an additional existing use, (e.g., salmonid spawning) exists, because of the requirement to protect levels of water quality for existing uses, then the additional numeric criteria for salmonid spawning would additionally apply (e.g., intergravel dissolved oxygen, temperature). However, if for example, cold water is not found to be an existing use, a use designation to that effect is needed before some other aquatic life criteria (such as seasonal cold) can be applied in lieu of cold water criteria (IDAPA 58.01.02.101.01).

Pollutant Relationships to Beneficial Uses Support Status

This section describes the relationship between the pollutant(s) of concern and the aquatic life or contact recreational beneficial use support status.

Temperature

Temperature is a component of water quality integral to the life cycle of fish and other aquatic species. Different temperature regimes result in varying aquatic community compositions. Water temperature dictates whether a warm, cool, or coldwater aquatic community is present. Many factors, natural and anthropogenic, affect stream temperatures. Natural factors include but are not limited to altitude, aspect, climate, weather, geothermal sources, riparian vegetation (shade), and channel morphology (width and depth). Anthropogenic factors include heated discharges (such as those from point sources), riparian alteration, channel alteration, and flow alteration.

Elevated stream temperatures can be harmful to fish at all life stages, especially if they occur in combination with other habitat limitations such as low dissolved oxygen or poor food supply. Temperature as a chronic stressor to adult fish can result in reduced body weight, reduced oxygen exchange, increased susceptibility to disease, and reduced reproductive capacity. Acutely high temperatures can result in death if they persist for an extended length of time. If stream temperatures become too hot, fish die almost instantaneously due to denaturing of critical enzymes in their bodies (Hogan 1970). The ultimate instantaneous lethal limit occurs in high temperature ranges (> 90 °F). Juvenile fish are even more sensitive to temperature variations than adult fish, and can experience negative impacts at a lower threshold value than the adults, manifesting in retarded growth rates. High temperatures also affect embryonic development of fish before they even emerge from the substrate.

Table 7 shows the different modes of thermally induced mortality on coldwater fish. This data is based on a laboratory study that involved uniform heating of water. Streams, naturally, have varying temperatures and refugia available for fish. Thus, while a stream may have elevated temperatures, these temperatures are not necessarily representative of the entire stream. The redband trout in the Mid Snake River/Succor Creek watershed <u>may</u> be physiologically adapted to higher temperatures and thus, able to withstand higher temperature ranges.

Table 7. Modes of thermally induced coldwater fish mortality (Oregon DEQ 2002).

Modes of Thermally Induced Fish Mortality	Temperature Range
Instantaneous Lethal Limit – Denaturing of bodily enzyme systems	>90° F >32° C
Incipient Lethal Limit – Breakdown of physiological regulation of vital processes, namely respiration and circulation	70° - 77° F 21° - 25° C
Sub-Lethal Limit – Conditions that cause decreased or lack of metabolic energy for feeding, growth, or reproductive behavior; encourage increased exposure to pathogens, decreased food supply, and increased competition from warm water tolerant species	64° - 74° F 17.8° – 23° C

Acceptable temperature ranges vary for different species of fish, with warm water species being the most tolerant of high water temperatures. The salmonid species most commonly found in the Mid Snake River/Succor Creek basin are redband trout in the streams and whitefish in the river. The populations in the streams are generally resident fish and thus, the temperature criteria will be applied on a stream-by-stream basis in order to protect the coldwater aquatic life uses that are present.

The Mid Snake River/Succor Creek watershed has always been typified by high summer air temperatures, high solar radiation, and low stream flows. Heat generally enters the stream through solar radiation, although agricultural return water and artesian wells can also contribute heat to certain streams. Elevated temperatures are exacerbated by human-caused diminished riparian areas and certain management practices, such as flow diversion, but water temperatures may never have been cold during the hottest periods of the year. Native fish have either physiologically adapted to the high temperatures or have been able to find colder water refuge in deep pools and by springs during periods of overall high stream temperatures.

Dissolved Oxygen

Oxygen is necessary for the survival of most aquatic organisms and essential to stream purification. Dissolved oxygen is the concentration of free (not chemically combined) molecular oxygen (a gas) dissolved in water, usually expressed in milligrams per liter (mg/L), parts per million, or percent of saturation. While air contains approximately 20.9 percent oxygen gas by volume, the proportion of DO in air dissolved in water is about 35%, because nitrogen (the remainder) is less soluble in water. Oxygen is considered to be moderately soluble in water. A complex set of physical conditions that include atmospheric and hydrostatic pressure, turbulence, temperature, and salinity affect the solubility.

Dissolved oxygen levels of 6 mg/L and above are considered optimal for aquatic life. When DO levels fall below 6 mg/L, organisms are stressed, and if levels fall below 3 mg/L for a prolonged period, these organisms may die. Dissolved oxygen levels below 1 mg/L are often referred to as hypoxic; oxygen levels that remain below 1-2 mg/L for a few hours can result in large fish kills. Anoxic conditions refer to those situations where there is no measurable DO. Juvenile aquatic organisms are particularly susceptible to the effects of low DO due to their high metabolism and low mobility (they are less able to seek more oxygenated water).

Oxygen is produced during photosynthesis and consumed during plant and animal respiration and decomposition. Oxygen enters water from photosynthesis and from the atmosphere. Where water is more turbulent (i.e., riffles, cascades), the oxygen exchange is greater due to the greater surface area of water coming into contact with the oxygen. The process of oxygen entering the water is called reaeration.

Water bodies with significant aquatic plant communities can have significant DO fluctuations throughout the day. An oxygen sag will typically occur once photosynthesis stops at night and respiration/decomposition processes deplete DO concentrations in the water. Oxygen will start to increase again as photosynthesis resumes with the advent of daylight.

Temperature, flow, nutrient loading, and channel alteration all impact the amount of DO in the water. Colder waters hold more DO than warmer waters. As flows decrease, the amount of reaeration typically decreases and the instream temperature increases, resulting in decreased DO. Channels that have been altered to increase the effectiveness of conveying water often have less riffle or reaeration. Thus, these systems may show depressed levels of DO in comparison to levels before the alteration. Nutrient enriched waters can have a higher biochemical oxygen demand due to the amount of oxygen required for organic matter decomposition and other chemical reactions. This oxygen demand results in lower instream DO levels.

Sediment

Both suspended and bedload sediment (sediment particles too large or heavy to be suspended, but still transported by flowing water) can have negative effects on aquatic life communities. Many fish species can tolerate elevated suspended sediment levels for short periods of time, such as during natural spring runoff, but longer durations of exposure are detrimental. Elevated suspended sediment levels can interfere with feeding behavior (difficulty finding food due to visual impairment), damage gills, reduce growth rates, smother eggs and fry in the substrate, damage habitat, and in extreme cases eventually lead to death. Eggs, fry, and juveniles are especially sensitive to suspended sediment.

Newcombe and Jensen (1996) reported the effects of suspended sediment on fish, summarizing 80 published reports on suspended sediments in streams and estuaries. For rainbow trout, physiological stress, which includes reduced feeding rate, is evident at concentrations of 50 to 100 mg/L when those concentrations are maintained for 14 to 60 days. Similar effects are observed for other species, although the data set is less reliable. Adverse effects on habitat, especially spawning and rearing habitat, were noted at similar concentrations.

Bedload sediment also adversely affects aquatic species. As sand and silt wash downstream, they can cover spawning gravels, increasing embeddedness in the streambed. If this occurs during incubation periods or while small fry are using the spawning gravels to develop, it may eliminate those areas and result in death. Bedload can also reduce intergravel DO levels by decreasing the critical re-oxygenating flow through the intergravel matrix. Organic suspended sediments can also settle to the bottom and, due to their high carbon content, lead to low intergravel DO.

In addition to these direct effects on the habitat and spawning success of fish, detrimental food source changes may also occur. Aquatic insects, which serve as a primary food source for fish, are affected by excess sedimentation. Increased sedimentation leads to a macroinvertebrate community that is prone to burrowing, thereby making the macroinvertebrates less available to fish. Community structure, specifically diversity, of the aquatic macroinvertebrate community also diminishes due to the reduction of coarse substrate habitat.

Water column sediment levels in the Snake River, Reynolds Creek, Jump Creek, Succor Creek, and Birch Creek have been measured through the collection of total suspended solids (TSS) and/or suspended sediment concentration (SSC) samples. Suspended sediment concentration is determined by measuring the dry weight of all the sediment from a known volume of a water-sediment mixture. The terms SSC and TSS are often confused in the literature and are frequently used interchangeably. However, the results may be considerably different if a substantial amount of sand-sized material comprises the sample. Mid Snake River monitoring data collected in 2002 show a close correlation between TSS and SSC data (r^2=.94, N=32) both year round and during the irrigation season, meaning that the samples are not dominated by sand-sized particles.

Settleable solids are defined as the volume (milliliters [mL]) or weight (mg) of material that settles out of a liter of water in one hour (Standard Methods 1985). In the Snake River, settleable solids consist primarily of large silt, sand, and organic matter. Total suspended solids are defined as the material collected by filtration through a 0.45 µm (micrometer) filter (Standard Methods 1985). The primary forms of TSS in the Snake River are silt, clay, and phytoplankton. Settleable solids and TSS both contain nutrients that are essential for aquatic plant growth. Settleable solids are not as nutrient rich as the smaller TSS, but they do affect river depth and substrate nutrient availability for macrophytes. In low flow situations, settleable solids accumulate on the Snake River bottom, thus decreasing water depth. This increases the area of substrate that is exposed to light, facilitating additional macrophyte growth.

Sediments originating from the drainage basin are primarily inorganic, have a low carbon content, have high densities, and often increase in the water column during runoff events. Sediments originating instream (from primary production) are organic with a higher carbon content and lower density and often increase in association with algal blooms. The concentration of organic sediments can be underestimated because of their lower density.

Total suspended solids not only result in excess nutrients in the water column through nutrient spiraling, but also directly affect the turbidity of water. The potential to increase primary production as well as the direct effect on reducing cold water aquatic life habitat are the major concerns with sediment in aquatic systems in the Mid Snake River/Succor Creek watershed.

Bacteria
Coliform bacteria are unicellular organisms found in feces of warm-blooded animals such as humans, domestic pets, livestock, and wildlife. Coliform bacteria are commonly monitored as part of point source discharge permits (National Pollution Discharge Elimination System [NPDES] permits), but may also be monitored in nonpoint source arenas. The human health effects from pathogenic coliform bacteria range from nausea, vomiting, diarrhea, acute respiratory illness, meningitis, ulceration of the intestines, and even death. Coliform bacteria do not have a known effect on aquatic life.

Coliform bacteria from both point and nonpoint sources impact water bodies, although point sources are typically permitted and offer some level of bacteria-reducing treatment prior to discharge. Nonpoint sources of bacteria are diffuse and difficult to characterize. Unfortunately, nonpoint sources often have the greatest impact on bacteria concentrations in water bodies. This is particularly the case in urban stormwater, agricultural areas and where wildlife is abundant. Wildlife may account for a significant percentage of the bacteria in some water bodies, although the exact percentage is difficult to determine.

Floating, Suspended, or Submerged Matter (Nuisance Algae)
Algae are an important part of the aquatic food chain. However, when elevated levels of algae impact beneficial uses, those levels are considered nuisance aquatic growth. The excess growth of phytoplankton, periphyton, and/or macrophytes can adversely affect both aquatic life and recreational water uses. Algal blooms occur where adequate nutrients (nitrogen and/or phosphorus) are available to support growth. In addition to nutrient availability, flow-rates, velocities, water temperatures, and penetration of sunlight in the water column all affect algae (and macrophyte) growth. Low velocity conditions allow algal concentrations to increase because physical removal by scouring and abrasion does not readily occur. Increases in temperature and sunlight penetration also result in increased algal growth. When the aforementioned conditions are appropriate and nutrient concentrations exceed the quantities needed to support algal growth, excessive blooms may develop.

Algae blooms commonly appear as extensive layers or algal mats on the surface of the water. When present at excessive concentrations in the water column, blue-green algae often produce toxins that can result in skin irritation to swimmers, and illness or even death in organisms ingesting the water. The toxic effect of blue-green algae is worse when an abundance of organisms die and accumulate in a central area. Two canine deaths due to ingestion of blue-green algal toxins were confirmed in November 2000 and several others suspected in fall of 1999 below the Minidoka Dam along the Snake River between Rupert and Burley (Eyre 2001).

Algal blooms also often create objectionable odors and coloration in water used for domestic drinking water, and can produce intense coloration of both the water and shorelines as cells accumulate along the banks. In extreme cases, algal blooms can also result in impairment of agricultural water supplies due to toxicity. Water bodies with high nutrient concentrations that could potentially lead to a high level of algal growth are said to be eutrophic. The extent of the effect is dependent on both the type(s) of algae present and the size, extent, and timing of the bloom.

When algae die in low flow velocity areas, they sink slowly through the water column, eventually collecting on the bottom sediments. The biochemical processes that occur as the algae decompose remove oxygen from the surrounding water. Because most of the decomposition occurs within the lower levels of the water column, a large algal bloom can substantially deplete DO concentrations near the bottom. Low DO in these areas can lead to decreased fish habitat as fish will not frequent areas with low DO. Both living and dead (decomposing) algae can also affect the pH of the water due to the release of various acid and base compounds during respiration and photosynthesis. Additionally, low DO levels caused by decomposing organic matter can lead to changes in water chemistry and release of sorbed phosphorus to the water column at the water/sediment interface.

Excess nutrient loading can be a water quality problem due to the direct relationship of high total phosphorus (TP) concentrations on excess algal growth within the water column, combined with the direct effect of the algal life cycle on DO and pH within aquatic systems. Therefore, the reduction of TP inputs to the system can act as a mechanism for water quality improvements, particularly in surface-water systems dominated by blue-green algae, which can acquire nitrogen directly from the atmosphere and the water column. Phosphorus management within these systems can potentially result in improvement in the following water quality parameters: nutrients (phosphorus), nuisance algae, DO, and pH.

Excess Nutrients

This discussion on nutrients focuses on the dynamics of nutrients in the Snake River because it is the only water body listed for nutrients in the watershed. However, practically speaking, the discussion would also be applicable to nutrient-enriched tributaries.

The principle nutrients limiting aquatic plant growth in the Snake River are nitrogen and total phosphorus. While nutrients are a natural component of the aquatic ecosystem, natural cycles can be disrupted by increased nutrient inputs from anthropogenic activities. The excess nutrients result in accelerated plant growth and can result in a eutrophic or enriched system. The nuisance aquatic growth caused by this enrichment is discussed in the following section.

The first step in identifying a water body's response to nutrient flux is to define which of the critical nutrients is limiting. A limiting nutrient is one that normally is in short supply relative to biological needs. The relative quantity affects the rate of production of aquatic biomass. Either nutrient (phosphorus or nitrogen) may be the limiting factor for algal growth, although phosphorous is most commonly the limiting nutrient in Idaho waters.

Ecologically speaking, a resource is considered limiting if the addition of that resource increases growth (DEQ 1999).

The *Upper Snake Rock Subbasin Assessment and TMDL* (DEQ 2000) and the *Snake River-Hells Canyon TMDL* (DEQ 2001) determined that TP is the primary limiting nutrient in the free flowing areas of the Snake River. Total phosphorus is the measurement of all forms of phosphorus in a water sample, including all inorganic and organic particulate and soluble forms. In freshwater systems, typically greater than 90% of the TP present occurs in organic forms as cellular constituents in the biota or adsorbed to particulate materials (Wetzel 1983). The remainder of phosphorus is mainly soluble orthophosphate, a more biologically available form of phosphorus that consequently leads to a more rapid growth of algae than TP. Chapter 5 discusses the selection of TP as a water quality target over orthophosphate. In impaired systems, a larger percentage of the TP fraction is comprised of orthophosphate. The relative amount of each form measured can provide information on the potential for algal growth within the system.

Nitrogen may be a limiting factor at certain times if there is substantial depletion of nitrogen in sediments due to uptake by rooted macrophyte beds. In systems dominated by blue-green algae, nitrogen is not a limiting nutrient due to the algal ability to fix nitrogen at the water/air interface.

Total nitrogen to TP ratios (N:P) in the Mid Snake River/Succor Creek reach of the Snake River showed that phosphorus was the limiting nutrient the majority of the time (DEQ 1993, 2002). Nutrient data from the riverine sections of the Snake River Hells Canyon and the Mid Snake/Rock Creek watershed also show similar findings (DEQ 2001, 2000). Total nitrogen to TP ratios greater than seven are indicative of a phosphorus-limited system while those ratios less than seven are indicative of a nitrogen-limited system. Only biologically available forms of the nutrients are used in the ratios because these are the forms that are used by the immediate aquatic community.

Nutrients primarily cycle between the water column and sediment through nutrient spiraling. Aquatic plants rapidly assimilate dissolved nutrients, particularly orthophosphate. If sufficient nutrients are available in either the sediments or the water column, aquatic plants will store an abundance of such nutrients in excess of the plants' actual need, a chemical phenomenon known as luxury consumption. When a plant dies, the tissue decays in the water column and the nutrients stored within the plant biomass are either restored to the water column or the detritus becomes incorporated into the river sediment. As a result of this process, nutrients (including orthophosphate) that are initially released into the water column in a dissolved form will eventually become incorporated into the river bottom sediment. Once these nutrients are incorporated into the river sediment, they are available once again for uptake by yet another life cycle of rooted aquatic macrophytes and other aquatic plants. This cycle is known as nutrient spiraling.

Nutrient spiraling results in the availability of nutrients for later plant growth in higher concentrations downstream. Nutrient concentrations in the Snake River have caused nuisance aquatic growths impairing designated or protected beneficial uses. As a result, nutrient concentrations in the Snake River exceed the present assimilative capacity.

Sediment – Nutrient Relationship
The linkage between sediment and sediment-bound nutrients is important when dealing with nutrient enrichment problems in aquatic systems. Phosphorus is typically bound to particulate matter in aquatic systems and, thus, sediment can be a major source of phosphorus to rooted macrophytes and the water column. While most aquatic plants are able to absorb nutrients over the entire plant surface due to a thin cuticle (Denny 1980), bottom sediments serve as the primary nutrient source for most sub-stratum attached macrophytes. The USDA (1999) determined that other than harvesting and chemical treatment, the best and most efficient method of controlling growth is by reducing surface erosion and sedimentation.

Sediment acts as a nutrient sink under aerobic conditions. However, when conditions become anoxic, sediments can release phosphorous into the water column. Nitrogen can also be released, but the mechanism by which this happens is different. The exchange of nitrogen between sediment and the water column is for the most part a microbial process controlled by the amount of oxygen in the sediment. When conditions become anaerobic, the oxygenation of ammonia (nitrification) ceases and an abundance of ammonia is produced. This results in a reduction of nitrogen oxides (NO_x) being lost to the atmosphere.

Sediments can play an integral role in reducing the frequency and duration of phytoplankton blooms in standing waters and large rivers (Robertson 1999). In many cases there is an immediate response in phytoplankton biomass when external sources are reduced. In other cases, the response time is slower, often taking years. Nonetheless, the relationship is important and must be addressed in waters where phytoplankton is in excess.

2.3 Summary and Analysis of Existing Water Quality Data

The amount of available data varied substantially between subwatersheds. Types of available data also ranged widely, but typically represent biological, chemical, and physical parameters. Data pertinent to the water quality issues being addressed are presented for each listed stream in this section.

Data Assessment Methods

Several primary methods were used to evaluate the data for this subbasin assessment. A detailed description of the primary methods is located in Appendix G. A brief description of each method is located below.

DEQ-Water Body Assessment Guidance – Second Edition (Grafe et al. 2002)
The Water Body Assessment Guidance (WBAG) describes DEQ's methods used to consistently evaluate data and determine the beneficial use support status of Idaho water bodies. The WBAG is not used to determine pollutant-specific impairment. Rather, it utilizes a multi-index approach to determine overall stream support status. The methodology addresses many reporting requirements of state and federal rules, regulations, and policies.

3. Subbasin Assessment – Pollutant Source Inventory

3.1 Sources of Pollutants of Concern

This chapter describes the point and nonpoint pollutant sources within the Mid Snake River/Succor Creek HUC. The nonpoint source descriptions are not intended to be specific. Rather, it is a description of the general processes whereby pollutants are delivered to the water bodies of concern.

Point Sources

The only NPDES permitted sources in the watershed are the wastewater treatment plants (WWTP) in Homedale and Marsing. Table 39 shows the permit limits for these facilities. Currently, the Marsing facility discharges TSS at levels that average below 50 mg/L. Neither of these facilities contains phosphorus limits in their current permits. The Homedale facility consists of a series of ponds and sand filters followed by chlorine treatment. After treatment, the effluent discharges into a drainage ditch that flows 0.25 miles prior to discharging into the Snake River. Prior to entering the Snake River, the ditch flows through a slough, which may contribute to nutrient removal. The Marsing facility consists of a series of aerated lagoons followed by chlorine treatment.

Table 39. National Pollution Discharge Elimination System-permitted facilities in the Mid Snake River/Succor Creek Watershed.

Facility	Design Capacity (mgd)[1]	Year Plant First Went into Operation	TSS[2] Limit
City of Marsing WWTP[3] (Permit # ID0021202)	0.3	1988	70 mg/L[4]
City of Homedale WWTP(Permit # ID0020427)	0.4	1980	70 mg/L

[1]Million gallons per day
[2]Total suspended solids
[3]Wastewater treatment plant
[4]Milligrams per liter

RCRA and CERCLA Sites

There are several sites in the Mid Snake River/Succor Creek subbasin that must comply with the federal Resource Conservation and Recovery Act (RCRA) or the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), commonly called Superfund. Most of these are CERCLA sites (Table 40), which are primarily associated with pesticide storage and disposal. The US Ecology Site is the only RCRA site. It operates under a permit administered by DEQ. It is a CERCLA site as well.

Bacteria

Bacteria targets are consistent with the numeric water quality standards for the protection of human health. As described in Table 6, the targets are expressed in terms of an instantaneous maximum and a 30-day geometric mean. If the instantaneous maximum is exceeded in a single sample, 4 additional samples must be collected within a 30-day period to calculate the geometric mean.

Monitoring Points

Monitoring points for each water body were discussed in detail in Section 2.3. Refer to that section for the location of monitoring points for each water body. An attempt was made in each subwatershed to monitor a representative sections of the streams, including a downstream compliance point for temperature and water chemistry measurements.

5.2 Load Capacity

The LC is the amount of pollutant a water body can receive without violating water quality standards. Seasonal variations and a MOS to account for any uncertainty are calculated within the LC. The MOS accounts for uncertainty about assimilative capacity, the precise relationship between the selected target and beneficial use(s), and variability in target measurement. The LC is based on existing uses within in the watershed. The LC for each water body and specific pollutant are tailored to both the nature of the pollutant and the specific use impairment.

A required part of the loading analysis is that the LC be based on critical conditions – the conditions when water quality standards are most likely to be violated. If protective under critical conditions, a TMDL will be more than protective under other conditions. Because both LC and pollutant source loads vary, and not necessarily in concert, determination of critical conditions can be more complicated than it may appear on the surface.

Temperature

In the stream segments shown in Table 38 requiring temperature TMDLs, the temperature water quality standard has not been met and the pollutant is excess heat. The primary source of temperature increases under anthropogenic control are those that increase the amount of solar radiation reaching the stream surface. Thus, the load of this resultant excess "heat" is calculated in joules per square meter per second (joules/m^2/sec). The LC is the amount of heat in the stream when the criteria or the best achievable temperature are met.

Stream shading is used as a surrogate for solar radiation. Therefore, the LC can also be expressed as the amount of shade needed to attain temperature standards. Where the numeric criteria cannot be met, naturally achievable conditions apply and full site potential shade is necessary.

Nutrients

The LC for nutrients was determined by calculation using the target of 0.07 mg/L TP and average flow values (calculated from 1999 and 2000 flow data, as described in Chapter 2).

Flow values for the Snake River at river mile 409 were determined using a flow budget developed for the SR-HC TMDL and applying the calculated proportional flow increase on a per mile basis.

The phosphorus LC is identified for an average flow scenario. While these values are helpful in giving a relative understanding of the reductions required, and will apply reasonably over most water years, it should be noted that the absolute level of reduction required will depend on flow and concentration values specific to a given water year. The target shown to result in attainment of water quality standards and support of designated uses in the reach is an instream concentration of less than or equal to 0.07 mg/L TP. Transport and deposition of phosphorus, and the resulting algal growth within the reach, is seasonal in nature. Therefore, application of the 0.07 mg/L TP target is also seasonal in nature, extending from the beginning of May through the end of September. The length of this period was also determined by when BMPs would be most effective.
Currently, total phosphorus levels are above the target concentration outside this period. However, algal blooms result from a combination of several factors including water temperature. Generally, water temperature precludes major nuisance blooms from occurring in early spring and late fall. In the fall, algal blooms may occur but after BMP implementation, the instream nutrient reductions during the critical period should prevent these blooms. In addition, BMPs are <u>most</u> effective during the critical period, which means that many BMPs will still have a protective effect outside of the critical period.

Due to water column nutrients, particularly TP, being more abundant than plant uptake rates, responses by plant communities to management efforts will take time. As TP inputs are reduced, plants that obtain nutrients from the water column (such as algae, epiphytes, and *Cerratophyllum sp.*) will likely be the first to decline. Because nutrients persist longer in sediments, plants that obtain nutrients from the sediments (such as *Potamogeton sp.*) will persist longer. Nevertheless, as reductions in TP (and sediment) continue, sediment bound nutrients will gradually be depleted as plant uptake outpaces recharge rates.

Sediment
The LC for sediment was determined based on the origin of the sediment. In those instances where the sediment generated from stream bank erosion, the LC is based on the load generated from banks that are greater than 80% stable. This load defines the LC for the remaining segments of the stream. In instances where a numeric water column target is defined, the LC is based on the instream load that would be present when the target is met. For example, the instream TSS target for Jump Creek is 65 mg/L. The LC for Jump Creek is based on maintaining 65 mg/L TSS throughout the stream during the critical flow period.

Bacteria
The LC for bacteria is based on the state water quality standard for *E. Coli.* The bacteria LC is expressed in terms of concentration (colonies/ml) because it is impractical to calculate a mass load for bacteria.

constitute a violation of the allocation; compliance is determined when a tributary does not cause exceedances of the seasonally applicable criteria in Succor Creek.
While only the sources listed in Table 47 received explicit LAs for bacteria, other nonpoint sources of bacteria loading to the stream, such as pasture lands in the floodplain, wild horses (to the extent possible) and feeding operations, should be managed to prevent the movement of bacteria into the stream.

An implicit MOS is built into the bacteria TMDL for Succor Creek. The analysis assumes no dilution is available to the tributaries in Idaho, when in fact, if the state of Oregon discharges according to the Oregon criteria (126/100 mL), dilution would be available. Since the input flows to the stream are greater than the withdrawals, there is a net gain in volume as the stream flows toward the Snake River. As a result, dilution becomes available every time water enters the stream. Thus, if the sources meet their load allocations, the net bacteria concentration in the stream should consistently decrease in the downstream direction.

Nutrient Allocations

The allocation strategy used for the nutrient TMDL is "equal concentration," meaning that all sources must discharge at a concentration of 0.07 mg/L TP or less where they enter the river. This allocation applies to the Snake River from Swan Falls Dam to the Oregon line. Seasonal variation and critical conditions were accounted for in this allocation and the target applies from May-September. The instream seasonal concentration at River Mile 449.3 (Murphy) is 0.071 mg/L. An allocation for the sections of the river from CJ Strike Reservoir to Castle Creek and from Castle Creek to Swan Falls Dam may be necessary in the future. However, at this time a further delineation of tributary sources and instream concentrations above Swan Falls is necessary to determine where these allocations might need to occur. In addition, the Snake River where it exits CJ Strike Dam must meet the 0.07 mg/L target. Using 1999 and 2000 data, the Snake River below CJ Strike Dam discharges at 0.07 mg/L, meeting the target.

Table 48. Instream Total Phosphorus Average Concentrations

Location	May-September Average Concentration (mg/L)
Snake River below CJ Strike Dam	0.07
Snake River at river mile 449.3	0.071
Snake River at Marsing (river mile 425)	0.082
Snake River at Homedale (river mile 417)	0.087

The Mid Snake River/Succor Creek WAG felt that equal concentration was the most equitable allocation scenario because this method does not require any sources to discharge below the 0.07 mg/L target and it does not penalize those sources that have already implemented best management practices.

Table 49 shows the nonpoint source load allocations but does not specifically distribute them to the individual tributaries. This load was determined using an overall water budget for the Snake River. The flows and the load allocation were calibrated against the existing drain nutrient and flow data.

DEQ was able to delineate the nonpoint source loads from point source wasteloads, but tributary specific information was not available for an entire year for all the tributaries. Pollutant loads vary between years due to cropping patterns, water availability etc., and to use data from 1992, 1995, 1999, and 2000 for tributary/drain specific allocations could potentially overestimate an individual tributary's load.

The 1995 and 2000 flow data and 1999/2000 nutrient data were used to determine loads for the mainstem Snake River. The data were provided by both Idaho Power and USGS (IPC 2002, USGS 2000). These water years were used because they represented average flow years. The 1999 and 2000 nutrient data were used because they represented the most recent data available. The 2001 nutrient data was not used for these calculations because 2001 was an extremely low water year and was not considered representative of average conditions.

The point source wasteloads for the two WWTPs are based on a discharge of 3.5 mg/L of TP (average discharge for unmonitored facilities as determined by SR-HC TMDL) at design capacity. Table 50 shows the current wasteloads not the WLA at design capacity. These current loads are lower than the allocated loads because both of these facilities are currently operating well below design capacity. If the facility expands beyond its design capacity then phosphorus discharge limits will be incorporated into its permit, meaning that the facility must either land apply, upgrade to biological nutrient removal or integrate another phosphorus removal process, and/or engage in pollutant trading as part of expansion in order to meet the TMDL target.

As part of the implementation plan, the wastewater treatment facilities will be required to write a nutrient reduction plan. This allocation does not preclude these facilities from incorporating effluent trading into their nutrient management plans. The wasteload allocations and load allocations presented in this TMDL may be adjusted under a state-approved effluent trading program as long as the loading capacity is not exceeded

Based on the current loads and wasteloads shown in Tables 49 and 50, the LAs and WLAs necessary to meet and maintain 0.07 mg/L TP in the river are shown in Table 51.

Table 49. Loads from nonpoint sources to the Snake River in the Mid Snake River/Succor Creek Subbasin.

Wasteload Type	Location	Load	Estimation Method
Total Phosphorus	Drain and Tributaries	381 kg/day	Direct Load Average

Table 50. Waste loads from point sources to the Snake River in the Mid Snake River/Succor Creek Subbasin.

Wasteload Type	Location	Current Load (kg/day)	Load Allocation (kg/day)	NPDES[1] Permit Number
Total Phosphorus	Marsing WWTP	2 kg/day	4 kg/day	Permit # ID0021202
Total Phosphorus	Homedale WWTP	3 kg/day	5 kg/day	Permit # ID0020427

[1]National Pollutant Discharge Elimination System
[2]Wastewater treatment plant

Table 51. Total Phosphorus load and wasteload non point source allocations based on average water year (Snake River from Swan Falls Dam to Oregon Line).

Water Body	Current Load (kg/day)	Seasonal Load Capacity (kg/day)	Seasonal Background Load (kg/day)	Load Allocation (kg/day)	Reduction Required (%)
Snake River at Homedale	2071	1667	453	1205	19.5
Drains, Tributaries and unidentified sources[2]	381	84	0	84	78

[1]Wastewater treatment plant
[2]Total phosphorus background not determined for drains and tributaries, estimated to be negligible
[3]Seasonal background accounted for in the load capacity

The load allocations can be summarized by the following load allocation equation:

LC (1667)= NB(453)+LA (1205)+WLA(9)
(the MOS is accounted for in the target concentration used to calculate the LC)

Sources of unmeasured load may include nonpoint source runoff from anthropogenic sources and precipitation events, unidentified small tributaries and drains, errors in gauged flow measurements, and ground water sources. Monitoring of both point source discharge loads and instream water column concentrations will be undertaken as part of the implementation process. Instream monitoring will be described in more detail in the site-specific implementation plans that will be completed 18 months following the approval of this TMDL. It is expected that at a minimum such monitoring will include the measurement of water column TP, chlorophyll-a and DO within each segment during time frames that represent high, low, and average flow conditions.

Future Growth

Where applicable, states must include an allowance for future loading in their TMDL that accounts for reasonably foreseeable increases in pollutant loads with careful documentation of the decision-making process. This allowance is based on existing and readily available data at the time the TMDL is established. In the case of the Mid Snake River/Succor Creek TMDL, an allowance for future growth is not recommended until such time as reductions indicate that beneficial uses or state water quality standards have been restored. Therefore, the allowance for future growth is zero. Growth can occur under the following auspices: 1) pollutant trading, 2) no net increase above the instream target parameters, and 3) no discharge where land application is the preferred option.

In regards to the point sources in the watershed, since their current allocation is based on their operation at design capacity, any growth that requires expansion of the existing facility triggers phosphorus removal requirements. A reserve capacity allocation is initially implicit since these facilities are not operating at design capacity. The reserve capacity allocation is therefore the difference between the current discharge and design flow discharge. This allows for expansion of existing sources or addition of new point sources discharge through trading or demonstration of an offset within the system. Above and beyond their capacity, a future growth allowance is not calculated since these facilities will have to implement phosphorus removal strategies that typically decrease phosphorus loads by 80% (DEQ 2002).

Any future point sources will receive a wasteload allocation of zero. A discussion of reasonable assurance can be found in Chapter 4.

Temperature Allocations

Succor Creek and Sinker Creek require temperature TMDLs. The TMDLs for these streams are premised on meeting the state of Idaho water temperature criteria for cold water aquatic life and salmonid spawning. Table 52 shows the criteria and the time of year when the criteria apply.

Table 52. State of Idaho water temperature criteria.

Temperature Criteria	Cold Water Aquatic Life (June 22-Sept 21)	Salmonid Spawning (March 1-June 15)
Instantaneous Maximum	22 °C., 71.6 °F.	13 °C., 55.4 °F.
Maximum Daily Average	19 °C., 66.2 °F.	9 °C., 48.2 °F.

forced to abandon the current system of discharge the money will be compelled from the residents of this community through a substantial increase in sewer fees The City of Marsing wastewater treatment plant operates safely and efficiently as it is. The contribution, any contribution, the wastewater treatment plant has to the water quality of the Snake River has to be infinitesimal compared to the other contributing sources outlined in the TMDL. The City of Marsing is a socially and economically disadvantaged community. Many, in fact, most of our residents are comprised of senior citizens, migrant laborers, farm workers and the working poor that live on a fixed or low income. These are good honest people who live in this town because it is affordable and they enjoy a good, quiet quality of life. When it is no longer affordable to live in Marsing, the folks will leave and Marsing will become a ghost town. An increase in sewer fees, any increase will mean a decrease of some other basic necessity. It would be a shame to have already disadvantaged families going without food to pay their SEWER bill. In summary, the cost to implement effluent disposal by land application would be absolutely prohibitive to the residents. The City of Marsing has conducted preliminary estimates of the cost to change to this type of effluent disposal and not only is the City faced with designing and constructing additional effluent storage, the City will have to bear the cost of engineering and construction to deliver the effluent for land application. The construction and engineering costs of the system coupled with the ongoing expense of transporting and spreading the effluent are just more than the residents of Marsing will be able to bear.	
Comments From: Harold Puri Mayor, City of Homedale Received via mail: February 28, 2003	**DEQ Response:**
1) "Homedale's current wastewater treatment facility operates well within the current requirement of DEQ. Historically the facility has operated safely and has experienced few problems. Should the proposed permit levels be initiated, the City's only alternative to our current system would be land application. Land application, which would be tremendously expensive as the alternative effluent disposal, would, by necessity, be passed onto city residents who can ill afford any increases in public services. Owyhee County,	This TMDL allows the Homedale Waste Water Treatment Plant to continue discharging at their current level. This TMDL allows time to plan for and obtain funds for nutrient removal by stating that the Homedale WWTP must meet the nutrient target of 0.07 if the plant is going to undergo expansion. The Homedale facility will have to experience considerable growth before design capacity is met.

including the City of Homedale, has one of the lowest per capita incomes in the state of Idaho. Our current population is 40% Hispanic, most of which rely on seasonal agricultural based employment and live, at best, with serious financial limitations. Senior citizens comprise another large number of our residents, they live on fixed incomes and would be faced with decreasing other basic necessities in order to pay their sewer bills. I believe Homedale's current wastewater treatment facility, has little, if any effect on the water quality of the Snake River. I would ask that you consider the tremendous impact of your proposed changes on all residents living in small rural communities in our State."	
Comments From: Robert Walker City Engineer, City of Homedale Received via fax: February 28, 2003	**DEQ Response:**
1) "As Engineer for the City I am hereby requesting that discharge levels for the City's wastewater treatment lagoon facility not be altered and I would ask that you consider the following: Capacity: Homedale's wastewater treatment lagoon facility was designed for a monthly maximum flow rate of 0.45 MGD. At the present time the annual average daily flow rate is 0.25 MGD and the maximum daily flow rate is 0.29 MGD. Therefore, the City of Homedale will have to experience considerable growth before the wastewater treatment lagoon facility reaches its design capacity. Economic Impact: As with all small rural communities the economic impact of the proposed discharge level proposed changes would be devastating Current Operation: Homedale's wastewater treatment facility currently operates safely, efficiently and well within current DEQ requirements.	This TMDL allows the Homedale Waste Water Treatment Plant to continue discharging at their current level. This TMDL allows time to plan for and obtain funds for nutrient removal by stating that the Homedale WWTP must meet the nutrient target of 0.07 if the plant is going to undergo expansion. The Homedale facility will have to experience considerable growth before design capacity is met which will give the city time to figure out how to finance any future changes.
Comments From: Craig Baker, Ranch Manager Sierra del Rio Received via fax: February 26, 2003	**DEQ Response:**
1) Sinker Creek should be designated as an intermittent stream. Even the historic name by which it is known indicates that it is naturally dewatered in some sections and then rises again in another area. On page 35 and page 105 the draft assessment says that the stream is dewatered below the diversion for Nahas Reservoir. In	The intermittent stream classification used in this TMDL is for those streams where perennial pools do not exist. Sinker Creek appears to have perennial pools throughout the summer in this reach. However, the stretch below the diversion for Nahas Reservoir is dewatered and does not have perennial pools. This stretch was not considered for