ORGANIZATIONS

63. Central Utah Pioneer Heritage, Shannon D. Miller, President

64. San Pitch River Watershed Stewardship Group, Thomas H. Shore, Watershed Coordinator

65. Trout Unlimited, Michael Bertelsen, Special Counsel, Utah Water Project

66. Trout Unlimited Stonefly Society, Frederick W. Reimherr

67. Utah Rivers Council, Rosalie Woolshlage, Staff Attorney

68. Western Wildlife Conservancy, Kirk C. Robinson, Executive Director

63. CENTRAL UTAH PIONEER HERITAGE, SHANNON D. MILLER, PRESIDENT

AL

ORIGINAL

Crookston, Peter L

From: Xmission [smiller@diveutah.com]
Sent: Monday, May 31, 2010 2:13 PM
To: PRO NarrowsEIS
Subject: In Favor of the Narrows Project

Dear Project,

63-1 As a 15 year resident of Sanpete County, I wish to express my strong opinion IN FAVOR of the narrows project.

Sanpete has long deserved the water and has long suffered without it. Our farmers need it, our conservation efforts support it and Sanpete residents are due what is ours.

For 70+ years the promise has been made to give Sanpete the water that is rightfully ours and it is now time to follow through on that promise.

The EIS supports new water development and efforts (which Sanpete has demonstrated) to conserve water. Sanpete can manage their water responsibly. Other jurisdictions need to manage their water as well and not take Sanpete's share any longer.

The legal wrangling has supported the water project and acknowledged Sanpete's right to the water, even up to the Utah Supreme Court and the US Dept of Justice.

As the 2nd poorest county in the state, the jobs and economic benefit for Sanpete created by building the Narrows project will be a great investment - one that will last for many years - even up to 100 years.

The recreation opportunities will benefit many, not just Sanpete.

Sanpete's pioneers understood the development of water and its important role in the success of a community. Sanpete has long honored Pioneer values and preserved the lessons taught by forbearers. Conservation is a strong tenrt of that is understood and remembered. Sanpete has long been regarded as the county that time forgot, but the people have not forgotten the lessons learned in history nor the promises made. It is time to give Sanpete the water long promised and allow the county to continue the long history of making the most out of a limited resource.

Sincerely,

Shannon D. Miller
President
Central Utah Pioneer Heritage Association

Date	Initials	Code
		100
		105
		107
	KS	700
6/22/10		770
6/22/10	PC	774

Classification: ENV-6.00
NARROWS
10043133
1122816

1

64. San Pitch River Watershed Stewardship Group, Thomas H. Shore, Watershed Coordinator

4L

ORIGINAL

San Pitch River Watershed Stewardship Group

OFFICIAL FILE COPY
RECEIVED
MAY 04 '10
May 3, 2010
Classification: ENV-6.00
Project: Narrows
Control No: 10029193
Folder I.D.: 1122816

Bureau of Reclamation
Attn. Peter Crookston
PRO-774 302 East 1860 South
Provo, UT 84606

Dear Mr. Crookston:

64-1 The San Pitch Watershed Stewardship Group has reviewed the Environmental Impact Statement for the proposed Narrows Dam and Reservoir. We strongly encourage the Bureau of Reclamation to implement the Preferred Alternative calling for the large reservoir.

Sanpete County clearly owns the water rights involved. The Supreme Court and the US Department of Justice have both acknowledged Sanpete's water rights. The Utah House of Representatives and Utah State Senate passed resolutions in 2008 and 2009 to implement the project.

The San Pitch Watershed Stewardship Group has the responsibility of implementing the San Pitch River Watershed Improvement Plan. Construction of the Narrows Dam and Reservoir is vital to environmental improvement of the San Pitch River.

Sincerely,

Thomas H. Shore
Watershed Coordinator
50 South Main, Suite 2
Manti, UT 84642

cc.

Senator Orrin Hatch
131 Russell Building
Washington, DC 20510

Senator Robert Bennett
431 Dirksen Building
Washington, DC 20510

Congressman Jason Chaffetz
1032 Longworth Building
Washington, DC 20515

Congressman Rob Bishop
124 Cannon Building
Washington, DC 20515

Congressman Jim Matheson
410 Cannon Building
Washington, DC 20515

T. SHORE
50 S. Main, Suite 2
MANTI, UT 84642

65. TROUT UNLIMITED, MICHAEL BERTELSEN, SPECIAL COUNSEL, UTAH WATER PROJECT

Michael J. Bertelsen
Special Counsel / Utah Water Project

58 Virginia Street
Salt Lake City, UT 84103
801-918-4490
e-mail: wpallc@comcast.net

June 7, 2010

By email: narrowsSDEIS@usbr.gov

Attn: Peter Crookston
PRO-774
302 East 1860 South
Provo, Utah, 84606-7317

Re: Comments of the Utah Water Project of Trout Unlimited on Narrows Project Supplemental Draft Environmental Impact Statement, Filing No. DES 09-55

We live in an era of crushing budget deficits, growing concern for the environment, and ever increasing cries for more limited government and local solutions. Those political realities underscore what many of those familiar with the proposed Gooseberry Narrows Project (the "Project") have long known: the costs of the project—economic, social, and environmental—far outweigh any potential benefit. For those reasons, the Bureau of Reclamation (the "Bureau") cannot reasonably decide to issue a Small Reclamation Projects Act (SRPA) loan to the Sanpete Water Conservancy District (SWCD) or grant the right to use federal lands to facilitate this ill-conceived boondoggle.

Trout Unlimited (TU) understands the long history of this project and the promise given to Sanpete County many years ago that it would one day be able to build a reservoir in the headwaters of the Price River to capture surface water and take it by transbasin diversion into northern Sanpete County. That history, however, cannot change a bad idea into a good one, nor can it ignore the sea change in federal laws and regulations that has taken place over the long intervening years.

65-1 There are good reasons that this project, some 70 years in the making, has never been built, and all those reasons attach with even greater force today. In short, there are better ways to provide Sanpete County with additional water. The SDEIS, however, fails to seriously consider any of these alternatives, and, instead, stacks the deck in favor of a Proposed Alternative that threatens not only the irrigation and drinking water supplies of Carbon County, but also one of Utah's premier recreational fisheries—all to deliver a relatively modest amount of late-season irrigation water to Northern Sanpete County at significant federal expense.

Summary

TU submits that the Supplemental Draft Environmental Impact Statement (SDEIS) prepared by the Bureau suffers from the following defects:

65-2 • The Action Alternatives do not reflect the stated preference of the Small Reclamation Project Act (SRPA) to fund existing projects that conserve water, energy, the environment or improve water quality. Moreover, the Project may not satisfy the cost requirements necessary to qualify for a SRPA loan.

65-3 • The Bureau states one Purpose and Need for the Project ("to develop an irrigation and M&I supply source for users in north Sanpete County, Utah") and then applies another, more restrictive standard (additional, supplemental storage water, available late in the season) to eliminate from formal study several more practical and cost-effective alternatives.

65-4 • The Bureau offers an inadequate analysis of water quality and quantity impacts for the Action Alternatives.

65-5 • The Bureau fails to analyze sufficiently the ability of the project sponsor (SWCD) to complete and maintain the Project.

65-6 • The Bureau fails to address adequately the potential impacts of climate change in evaluating the Action Alternatives.

65-7 • Lastly, the Bureau fails to ensure that the proposed mitigation compensates for the economic, social, and environmental harms that would be caused by the Project.

Given these failures, the Bureau has failed to satisfy the requirements of the National Environmental Policy Act of 1969 (NEPA) and cannot proceed in accord with applicable law either to approve the SRPA loan nor Sanpete's use of Reclamation withdrawn lands for the
65-8 Project. Nor is the SDEIS efficient to support the Bureau and Forest Service changing their current administration of lands within the area that would be affected by the project.

Legal Standards

Small Reclamation Projects Act

The express purpose of the SRPA "is to encourage State and local participation in the development of projects under the Federal reclamation laws, with emphasis on rehabilitation and betterment of existing projects for purposes of significant conservation of water, energy and the environment and for purpose of water quality control, and to provide for Federal assistance in the development of similar projects in the seventeen western reclamation States by non-Federal organizations." 43 U.S.C.A. § 422a (emphasis added).[1]

[1] Congress amended the SRPA in 1986 to add the underscored language. *See id.*, Public Law Historical and Statutory Notes; Pub.L. 99-546.

The act further specifies that "[t]he maximum allowable estimated total project cost of a proposal submitted during any given calendar year shall be determined by the Secretary using the Bureau of Reclamation composite construction cost index for January of that year with $15,000,000 as the January 1971 base." 43 U.S.C. § 422b(f). According to the Bureau's own calculations, that means total project cost must be less than "about $50 million in today's dollars" to remain eligible for funding under SRPA. SDEIS at 2-58.

National Environmental Policy Act (NEPA)

NEPA represents the Nation's sweeping commitment to "prevent or eliminate damage to the environment and biosphere." *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989). The statute accomplishes this goal by "focusing government and public attention on the environmental effects of proposed agency action." *Id.* By doing so, NEPA "ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast." *Id.*

The sweeping policy goals announced in §101 of NEPA are realized through a set of action-forcing procedures that require that agencies take a "hard look" at environmental consequences before resources are committed. *Id.* at 350-51.

NEPA requires all federal agencies to prepare an environmental impact statement (EIS) prior to major federal action significantly affecting the quality of the environment. 42 U.S.C. § 4331; *Robertson v. Methow Valley Citizens,* 490 U.S. 332, 348 (1989). An EIS must include a detailed statement of (1) the environmental impact of the proposed action; (2) any adverse environmental effects which cannot be avoided should the proposal be implemented; (3) alternatives to the proposed action; (4) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long term productivity; and (5) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. *Id.* at 348-9 (*citing* 42 U.S.C. § 4332).

NEPA requires federal agencies to evaluate the "direct," "indirect," and "cumulative" impacts of a proposed federal action. *Id.* at § 1508.25(c); *see also id.* at §§ 1508.7, 1508.8. Direct effects are those that "are caused by the action and occur at the same time and place." *Id.* at § 1508.8(a). Indirect impacts are those "which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable." *Id.* at § 1508.8(b). A project's "cumulative impact" is as follows:

> [T]he impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions . . . . Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Id. at § 1508.7; *see also Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1379 (9th Cir. 1998) (with respect to a cumulative impacts analysis, an agency must provide "some quantified or detailed information" because "[w]ithout such information, neither courts nor the public . . . can be assured that the [agency] provided the hard look that it is required to provide").

Information provided in an EIS must be of high quality and must include accurate scientific analysis. 40 C.F.R. § 1500.1(b). "The NEPA process is intended to help public officials make decisions that are based on understanding environmental consequences, and take actions that protect, restore and enhance the environment." 40 C.F.R. § 1500.1(c). "When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking." 40 C.F.R. § 1502.22. If the information cannot be obtained because the overall costs would be exorbitant or the means to obtain the information unknown, the agencies must explain the relevance of the incomplete or unavailable information, provide a summary of existing credible evidence, and evaluate the impacts based on theoretical approaches or research methods generally accepted in the scientific community. 40 C.F.R. § 1502.22(b).

To fulfill the essential purposes of NEPA, federal agencies are required, to the fullest extent possible, to "use all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment." 40 C.F.R. § 1500.2. These means include (1) avoiding the impact altogether by not taking the action; (2) minimizing the impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; (5) compensating for the impact by replacing or providing substitute resources or environments. 40 C.F.R. § 1508.20. Mitigation measures must be fully discussed in the EIS. 40 C.F.R. § 1502.14(f) and 40 C.F.R. § 1502.16.

Discussion

65-9 **(1) The Action Alternatives do not reflect the stated preference of the Small Reclamation Project Act (SRPA) to fund existing projects that conserve water, energy, the environment or improve water quality. Moreover, the Project may not satisfy the cost requirements necessary to qualify for a SRPA loan.**

While the express intent of SRPA is to emphasize "rehabilitation and betterment of existing projects for purposes of significant conservation of water, energy and the environment and for purpose of water quality control," 43 U.S.C. § 422a, the Project offers none of these benefits, and, in fact, represents a new dam and dramatically expanded transbasin diversion that attempts to hide adverse effects to water quantity, water quality, and the broader environment by shifting them around and pointing to mitigation measures that cannot possibly compensate for a variety of real harms.

At best, the Project robs Peter to pay Paul, promoting new water supplies for Sanpete County at the expense of both the quantity and quality of water available to Carbon County. Similarly, the project offers new recreational benefits to San Pete County, but only at the expense of existing recreational opportunities in Carbon County.

Additionally, the Project may not meet the cost criteria that would render it eligible for a loan under the SRPA. As the Bureau itself recognizes, to be eligible for funding under the SRPA, "total project costs must be under $15 million indexed from 1956 to the present or about $50 million in today's dollars." SDEIS at 2-58. Although the Bureau estimates that the Proposed Action Alternative (large reservoir) would cost $40.3 million to complete (*see, e.g.*, SDEIS at 2-31), the only other available study, completed by CH2M Hill in 2008, estimates a total project cost of **$57.8 million, *exclusive of land acquisition***. CH2M Hill also projects that the cost for simply rehabilitating the existing tunnel would be $1.5 million, but to enlarge it as is contemplated by the Proposed Alternative would cost $2.6 million. This means that, should the CH2MHill study be deemed credible, as both the Bureau and SWCD vociferously insist that it must, the Narrows Project would cost substantially more that $61.4 million once SWCD purchases the land necessary to complete the project—well in excess of the Bureau's stated cap of "about $50 million dollars."[2]

65-10 The Bureau has made no effort to reconcile these competing numbers, leaving substantial uncertainty as to whether SWCD would qualify for a SRPA loan at all.

(2) The Bureau states the Project's Purpose and Need broadly, but then applies a conflicting and impermissibly narrow standard to eliminate several reasonable (and more cost-effective) alternatives.

According to the SDEIS, the Purpose and Need for the Project is "to develop an irrigation and M&I supply source for users in north Sanpete County, Utah whereby the average annual shortages to irrigators in the project area might be reduced as nearly as possible to 5 percent (%), which is considered full irrigation supply for Reclamation projects." *Id.* at 1-6 (emphasis added). When it comes to *applying* that standard, however, the Bureau uses a much narrower litmus test that effectively precludes anything but the Proposed Action Alternative. *See, e.g., id.* at 2-43 (dismissing a direct diversion alternative because it fails to provide "irrigation water when it is needed during the mid- and late-summer months" and because the alternative cannot provide an instream flow requirement that presupposes that the project will be built) (emphasis added); *id.* at 2-49 (rejecting an conservation alternative because the alternative does not "adequately satisfy the need for additional supplemental irrigation water") (emphasis added).

If the Purpose and Need of the Project is to provide Sanpete residents with irrigation and M&I water (a reasonable overarching goal) then the Bureau cannot reasonably reject plausible alternatives out-of-hand on the grounds that the alternatives do not achieve that purpose in a particular and narrowly drawn way. First, the Bureau identifies 'develop[ing] an irrigation and M&I supply source' as the overarching objective, then tries to narrow that further by saying the purpose is to "reduce irrigation shortfalls," and further still to meet a 5% shortfall threshold. Such arbitrary application of shifting and even conflicting standards is precisely the kind of agency action that NEPA was designed to prevent.

---

[2] In considering these competing estimates, we note that the Bureau's Provo Office has consistently underestimated the cost of other projects in the area. So, for example, the Bureau originally estimated the cost of the Scofield Dam seismic upgrade to be approximately $3 million. The final costs, however, were approximately $7.5 million. Similarly, though upgrades and repairs needed at the Scofield spillway were estimated at $6 million, costs have already exceeded $11 million and the project is not yet complete. *See* Bureau of Reclamation, *Scofield Dam - SOD Contract & Non-contract Costs - Total to Date* (March 31, 2010).

So, while federal agencies may give deference to an applicant's stated purpose and need, agencies must look more broadly to ensure consideration of reasonable alternatives. *See Citizens Committee to Save our Canyons v. U.S. Forest Service*, 297 F.3d 1012, 1030-31 (10th Cir. 2002).

65-11 More importantly, an agency cannot, as here, define objectives so narrowly as to preclude the reasonable consideration of alternatives. *See Davis v. Mineta*, 302 F.3d 1104 (10th Cir. 2002); *see also Simmons v. Corps of Engineers*, 120 F.3d 664, 666 (7th Cir. 1997) (holding that the Army Corps "defined an impermissibly narrow purpose" and "therefore failed to examine the full range of reasonable alternatives and vitiated the EIS"). Lastly, the analysis of potential alternatives does not reflect a mere aspirational standard; rather, "[t]he alternatives requirement is the linchpin of NEPA, and the alternatives section is "the heart" of the EIS. *Wyoming v. U.S. Dep't of Agriculture*, 570 F.Supp.2d 1309, 1336 (D. Wyo. 2008); *see also* 40 C.F.R. § 1502.14 (identifying the alternatives analysis as the "heart" of NEPA).

Here, the SDEIS falls woefully short of the kind of careful consideration of alternatives required by NEPA. In the end, the SDEIS gives consideration to only four, formal alternatives: The Proposed Alternative (large dam), a Second Alternative (medium sized dam), a Third Alternative (small dam), and a No Action Proposal. Numerous other alternatives are dismissed summarily, often based on little more than the agency's own *ipsi dixit. See, e.g., id.* at 2-60 (dismissing a groundwater pumping alternative because drawdown "could affect" adjacent wells).

In fact, many of these alternatives offer to deliver on the broad purpose and need articulated by the Bureau—reduced average annual shortages for irrigators in north Sanpete County—at far less cost and with far fewer social or environmental impacts.

More specific problems with the Bureau's analysis of the alternatives are described below:[3]

	Section	Statement	Analysis
65-12	2.3.1 – Direct Diversion w/o Reservoir (p. 2-43)	Dismisses an alternative because it does not have "fish and wildlife benefits" that would make the project eligible for additional grant money. As a result, "total project cost would be borne by the water users." Also suggests annual pumping costs of $7200 would be too high.	• The fish and wildlife "benefits" touted in the SDEIS are illusory (merely offsets for other harms), and apparently designed less for their actual benefit than as convenient hooks to help subsidize an otherwise exorbitantly expensive project. • At $7200/year, it would take nearly four thousand years(!) to make up the difference in cost between the estimated $12 million dollars for this alternative and the Bureau's low-estimate of $40M for the Proposed Action Alternative.
65-13	2.3.2 – Conservation w/o Development of Other Water Supplies (p. 2-47, 48)	Dismisses alternative because, in the Bureau's narrow application of "need," water made available through conservation does not equal the "new" source of water contemplated by the DEIS. States, without more, that "due to the	• Applies criteria arbitrarily and inconsistent with the broad statement of need to reduce water shortages for irrigators based on annual averages. • Fails to address whether an outlay of $40M would make leveling more practical or

[3] These specific comments are intended to show examples rather than document a comprehensive list of questionable statements and assertions in the SDEIS.

		topography and shallow depth of the soil, land leveling is generally not practical or economically feasible in the project area."	economically feasible.
65-14	2.3.5 – Valley Damsite Alternative (p. 2-51)	"Lacking modification to the 1984 Compromise Agreement, the applicant would not be able to secure the water rights necessary to establish project water supplies as required by SRPA."	• Presupposes—in error—that revisiting the 1984 Compromise Agreement is impossible, even though Carbon County has offered repeatedly to renegotiate the Agreement if revisiting the Narrows Project is on the table.
	2.3.7 – Year Round Release w. Groundwater Exchange Pumping Alternative (p. 2-55)	Annual pumping costs estimated at $52/acre foot, plus initial project costs of $6.5 million. *Id.* § 2.3.7 at 2-55. Dismisses this alternative because "[a]nnual costs far exceed the sponsor's repayment capacity and other available resources as needed to maintain eligibility for SRPA funding." *Id.* § 2.3.7.1 at 2-55. The SDEIS contains conflicting statements about the "average annual cost" of water under the proposed alternative. In one place, the cost is estimated at 1.07 times the cost of the Proposed Action Alternative, *id.* § 2.3.7 at 2-55; in another, at 1.75 times that cost. *Id.* at § 2.3.7.1 at 2-56.	• At $52 per acre foot, the cost savings relative to the Proposed Alternative could pump nearly 650,000 acre feet of water, enough to meet the "purpose and need" stated in the SDEIS for 120 years. • Unclear how the costs of this alternative "far exceed the sponsor's repayment capacity" when the Bureau calculates the total cost of this alternative at 1.07 times the cost of the Proposed Action Alternative. • The Bureau rejects this alternative based, at least in part, on an apparent typographical error. *See id.* § 2.3.7.1 at 2-56.

(3) The Bureau offers an inadequate analysis of water quality and water quantity impacts for the Action Alternatives.

The Bureau has failed to address serious water quality impacts in the Project Area, impacts that undermine the justification for the Project.[4]

The SDEIS readily concedes a range of potential adverse water quality impacts associated with the Proposed Action Alternative. Those impacts include:

- Degradation of existing water quality in the current nondegradation segments of project area streams during construction
- Potentially decreased DO levels and increased fishkills in Lower Gooseberry Reservoir due to decreased inflow

[4]TU addresses water quality issues here because water quality issues figure prominently in the SDEIS and play an important role in the Bureau's Project review. Having said that, TU recognizes that water quality protection plays a its most critical role in the context of U.S. Army Corps of Engineers (USACE) section 404 permitting and the State of Utah's 401 certification and anti-degradation review, which TU will address in greater detail in comments submitted to USACE next week.

- Increased potential for fishkills in Scofield Reservoir as a result of possible decreases in water quality due to reduced inflows

- Increase in average salinity levels in the Colorado River at Imperial Dam of 0.54 mg/L due to an average annual depletion of 5,597 acre-feet

Id. at 3-54.

In particular, the SDEIS recognizes that Scofield Reservoir already suffers from water quality problems. The reservoir is often at or near a eutrophic state—in other words, it suffers from excessive nutrients tied to too much phosphorus in the water, a situation that leads to algae blooms and low oxygen levels in the water, a situation that often leads to fish kills, particularly during low water and/or the hot summer months.

Using the Trophic State Index (TSI),[5] a common measurement for nutrient loading, the Bureau calculates an average TSI for Scofield of 47.1 for the period 1981-2007. *See* SDEIS Table 3-15 at 3-48; *see also* text at 3-49. A fully eutrophic system occurs at a level of 50 TSI or higher. Thus, Scofield sits perilously close to designation as fully eutrophic. Further, water quality studies conducted back in 1990 show blue-green algae comprised 99% of all taxa present, another related indicator of poor water quality conditions.[6]

The Utah Department of Water Quality (UDWQ) listed Scofield as impaired for excess total phosphorus and low DO in 1998.[7] UDWQ developed a TMDL for Scofield in 2000, which specifies that overall phosphorus loading in Schofield must be reduced by 1,881 kg/yr,[8] a
65-15 standard that assumes that current water levels and flushing rates are maintained. By the Bureau's own calculations, however, the Proposed Action Alternative would reduce the average size of Scofield Reservoir from 42,360 to 31,500 acre feet – a reduction of 26%, and one with serious implications for phosphorus loading and other water quality problems. *See* SDEIS § 3.3.3.2 at 3-16.

65-16 Nor has the Bureau conducted any study or other evaluation of how reduced flows into Scofield will impact water temperature—another important indicator of water quality, particularly when it
65-17 comes to supporting coldwater fish like trout. Even though warmer water is more conducive to plant and algal growth[9], *no studies have been done to estimate the impact a 26% reduction on average reservoir size would have on average water temperatures, eutrophication and fish kills.*

[5] TSI "is a general measure of the level of eutrophication in a reservoir....TSI values greater than 50 are indicative of a eutrophic system, and TSI values between 40-50 are indicative of a mesotrophic system." UDEQ, *Scofield Reservoir TMDL (2000)* (attached as Exhibit A).

[6] Judd, H.L. 1990. *Scofield Reservoir Restoration Through Phosphorous Control*, Dept. of Environmental Quality, Utah Div. Of Water Quality.

[7] *Scofield Reservoir TMDL* at 5.

[8] *See* SDEIS § 3.5.1.3 at 3-50; *see also Scofield Reservoir TMDL* at 1.

[9] *A kinetic approach to the effect of temperature on algal growth*. Goldman & Carpenter, Woods Hole Oceanographic Institution 1973 (attached as Exhibit B).

None of this suggests that the Bureau has met its obligations under NEPA to "use all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment." 40 CFR §1500.2.

65-18 The Bureau has failed to address negative effects on water quantity within the project area and the implication of the reduced reservoir volumes on municipal, industrial, and agricultural water supplies as well as fisheries and other recreation values.

As the Bureau itself admits, under the Proposed Alternative, "Scofield Reservoir would operate at a lower level;" consequently, "there is an increased potential for the reservoir to be drained to the bottom of its active storage. *The frequency of this occurrence increases from 3 times in 43 years to 12 times in 43 years with the proposed Action.*" SDEIS § 3.3 at 3-12 (emphasis added). This quadrupling of the risk of having Scofield run out of active storage has serious implications for (1) PacifiCorp and other businesses that rely on flows below the Reservoir, (2) Carbon County citizens, who rely on Scofield for their drinking water, (3) agricultural producers in Carbon County who rely on Scofield for irrigation, and (4) the large number of recreational users—including cabin owners, fishermen, and boaters—who rely on Scofield for the excellent recreational opportunities it provides.

To these concerns, the Bureau says, in essence, "too bad," and suggests that all those who have benefited from increased storage in Scofield are essentially free riders, who have enjoyed a windfall to which they would not otherwise be entitled. *See generally* SDEIS § 3.3.3.2 at 3-19 ("Figure 3-2 also shows that there would be no minimum pool for fishery in Scofield Reservoir had it not been enlarged."). This attempt to view the Proposed Alternative solely through the lens of a 1940s-era agreement ignores the complex history of the dispute between Sanpete and Carbon Counties, the likelihood that the Scofield dam would have been raised in the 1940s regardless, the dramatic changes we have seen in the intervening years in federal funding, environmental review, and other areas of law, and, perhaps most importantly, the real harms this project threatens to the citizens of Carbon County.

This constricted view allows the Bureau to tout the Proposed Action Alternative as *the only possible solution,* despite the real damage it threatens to water quality and water supply and the many citizens of Utah who have come to rely on both.

Again, this narrow, hide bound perspective does not suggests that the Bureau has met its obligations under NEPA to "use all practicable means, consistent with the requirements of the Act and other essential considerations of national policy, to restore and enhance the quality of the human environment and avoid or minimize any possible adverse effects of their actions upon the quality of the human environment." 40 CFR §1500.2.

65-19 **(4) The Bureau fails to analyze sufficiently the ability of the project sponsor (SWCD) to complete and maintain the Project.**

According to its 2005 audited financial statement (the most recent financial statement available at this writing), the SWCD had no full-time employees. It typically spent nearly 60% of its budget on operating expenses and the remainder "for capital additions on the narrows (sic) project in upper Gooseberry, east of Fairview, Utah."[10] With annual revenues of less than $400,000, this means SWCD would have $150,000 left in its annual budget to service debt and to conduct all other components of the project as outlined in the SDEIS. Its average expenditures on Narrows project costs over the period 2002 to 2005 were approximately $78,000 per year. In 2005 it spent $70,000 on public relations for the project, and another $83,000 on legal and engineering fees—also largely attributable to the Project.

As set forth in the SDEIS, the district would be given direct responsibility for the acquisition, maintenance, construction, oversight, and operation of the numerous project components, all of which are legally mandated and critical to the successful operation of the Project. These responsibilities include, but are not limited to:

- The purchase of 220 acres of land adjacent to Mud Creek in Carbon County;
- Fencing of 11 miles of stream on the Price River below Scofield Reservoir (and, presumably, maintaining those fences);
- Purchasing 640 acres of land adjacent to Fish Creek in Carbon County;
- Funding and maintenance of all wetland mitigation proposed for the project in Carbon County, as well as proposed off-site mitigation in Sanpete County;
- Primary responsibility for all wildlife measures described in chapter 2 of the SDEIS, which in turn include:
  - Improvement & maintenance of 9.5 miles of stream segments,
  - Fencing and planting of additional riparian habitat in addition to that listed above; and
  - Primary responsibility for implementing all fisheries measures, acquiring all lands and rights of way necessary to execute the project as described in the SDEIS;
- Providing native seed for watershed and range improvement projects defined in the proposed mitigation; and
- Full funding and construction cost for all improvements, including financing for range improvements on USDA Forest Service land.

Again, SWDC would bear full responsibility to fund monitoring, as well as any adjustments, repairs, and upgrades to all of the above-listed structures or programs in perpetuity.

---

[10] *Sanpete County Water Conservancy District Financial Statements*, December 31, 2005 (attached as Exhibit C).

The task of maintaining phosphorus reduction measures has proven daunting for UDWQ, a fully-funded state agency charged with development and maintenance of water quality and wildlife
65-20 protection measures. If the Narrows project were completed as described in the SDEIS, the Bureau would be handing over to SWCD, with virtually no resources, plenary control over all mitigation for the Narrows Project in spite of the obvious fact that SWCD has no vested interest in the success of mitigation efforts in Carbon County, and will have no reason to fund or maintain structures there once the Narrows Project is built. The SDEIS considers none of this, nor does it describe how the Bureau would ensure accountability for completion of all mitigation.

An overview of the proposed financial aspects of the Project makes matters even worse.

The SDEIS shows SWCD cannot adequately service Project debt. A closer look at the numbers reveals clearly that the annual budget of SWCD cannot service interest and principal repayments on the project, even if one adds in the incremental value of new water the project might deliver. Importantly, the vast preponderance of water from the project will go to irrigation. Consequently, the value of an incremental crop yield based upon completion of the project is relatively small, and new debt service based upon this revenue source is minimal, at best.[11]

The bottom line is that the SRPA program cannot make a loan in excess of approximately $50 million, and this Project, which may well exceed that amount based on studies to which SWCD was itself a party, should not be shoehorned into a program that does not fit. Nor should the Bureau bless a project with such little transparency in terms of how the project sponsor will execute all the necessary requirements of the loan.

65-21 **Lastly, the SDEIS assumes funding from other sources that are either speculative or no longer exist.** As described in the SDEIS, SWCD and the Bureau hope to squeeze the Narrows Project into the SRPA program by assuming that they will obtain at least two additional, major funding sources. First, they hoped to obtain from U.S. Senator Bennett, the ranking minority member of the Energy & Water Subcommittee of the Senate Appropriations Committee, an earmark of $12 million in federal funding specifically for the project. Since Senator Bennett will be leaving the Senate at the end of the year, a Congressional earmark for the Narrows is unlikely to materialize.

Second, project proponents seek to get bonding for an indeterminate sum of money to complete the project beyond what they might obtain from SRPA. Nevertheless, SWCD has no current bonding authority, no rating from any recognized rating agency, and, as noted above, does not have the revenue stream to service a bond of the size needed to accomplish the Project.

Third, hopes of obtaining unobligated money from the State of Utah's Water Resources Conservation and Development Fund are questionable at best. Two large, high profile water projects—the Lake Powell Pipeline and the Bear River Project—sit at the top of the State's

---

65-22 [11] In that regard, TU believes that the financial analysis in the SDEIS regarding SWCD's ability to pay is inadequate, particularly where the expenditure of federal funds is concerned. Therefore, to the extent that this information should be part of the public record, TU may pursue this information through all available and lawful means.

priority list for this fund. Moreover, the fund is only available to entities who can repay the full loan amount, as it is a revolving fund, which depends upon repayment of project funding to continue to operate. As is clear from an analysis of the cost estimates, SWCD has a limited ability to service debt, especially considering the increased liability SWCD would have for land acquisition, mitigation costs and additional ongoing maintenance and monitoring.

Finally, in every significant aspect, the Narrows Project would encourage the opposite policy from those that SRPA is designed to promote. Specifically, the SRPA values conservation, but the Narrows would increase water for irrigation without any requirement that water delivered be used efficiently on farms that have demonstrated best conservation management practices. Second, SRPA funding is supposed to go to projects that conserve the environment, yet the Narrows would cause significant adverse effect to the environment, threatening Utah's third best flat water fishery, and providing mitigation in the form of two smaller, mediocre reservoir sport fisheries. Finally, while the SRPA seeks to fund projects that conserve water quality, the SDEIS reveals, unequivocally, that the Narrows will worsen water quality, both for one of Utah's top reservoir fisheries, and also for Carbon County's drinking water.

65-23 **(5) The Bureau fails to address adequately the potential impacts of climate change in evaluating the Action Alternatives.**

Federal agencies and NGOs alike must increasingly deal with the potential implications of climate change, a reality that the Bureau itself has recognized recently. *See Literature Synthesis on Climate Change Implications for Reclamation's Water Resources* (September 2009), *available at:* http://www.usbr.gov/research/docs/climatechangelitsynthesis.pdf.

While the Bureau offers lip service to the importance of this issue, it dismisses it with the cursory observation that "without verified models addressing climate change at this project level, Reclamation concludes that, at this time, data and modeling tools are not yet developed to the point that meaningful analysis of a small project can be achieved." SDEIS at 1-25.

The lack of a project specific model, however, should not excuse the Bureau from evaluating the Proposed Action and Alternatives in light of the following:

- Impacts of climate change for annual precipitation in the project area;
- Temperature changes likely to occur within Scofield Reservoir and likely effects;
- Impacts of climate change on threatened and endangered Colorado River species, and the likelihood of any Proposed Action to enhance or exacerbate such impacts;
- The degree to which climate change impacts can or should affect the Statement of Purpose and Need, and specifically whether the delivery of water contemplated by any Proposed Alternative is:
  (1) Reasonable in light of current and future uses of available water;
  (2) Likely to achieve stated goals (e.g. 95% irrigation service); and
  (3) Possible given the amounts of water likely to move through the Price River headwaters on an ongoing basis, either with or without the diversion.

See generally Center for Biological Diversity v. Kempthorne, 588 F3d 701, 710 (2009) ("An agency's blanket statement that it has considered all evidence is ineffective where the analysis makes clear that a crucial issue has been overlooked.").

To be clear: the relevant nexus here is not of TU's making, but rather comes from the agency itself. After all, the SECURE Water Act (P.L. 111-11 Subtitle F (2009)) requires the Bureau to incorporate climate change into its water planning efforts. Similarly, in 2007, the Bureau's Climate Change Work Group issued Appendix U, a report that addressed how Reclamation can incorporate climate change information into Colorado Basin planning studies. *See* Bureau of Reclamation, Climate Technical Work Group, *Appendix U: Review of Science and Methods for Incorporating Climate Change Informationinto Reclamation's Colorado River Basin Planning Studies* (August 21, 2007);[12] The impacts identified in that document played a role in the Bureau's decision regarding Colorado River shortage criteria. In other words, the Bureau itself has recognized a commitment to conduct a meaningful analysis of climate change impacts—particularly in the Colorado River Basin—and the agency cannot hide behind a lack of project-specific climate modeling by the Bureau itself to avoid conducting any analysis at all.

65-24 **(6) Lastly, the Bureau fails to ensure that the proposed mitigation compensates for the economic, social, and environmental harms that would be caused by the Project.**

The biggest failure of the SDEIS is a failure of mitigation: suggesting that the creation of a new, small headwater impoundment will compensate for the potential loss of one of Utah's premier flatwater fisheries, or that a little bank stabilization on private land will compensate for increased phosphorus and nutrient loading, that benefits here will always cancel out negative effects there in a kind of perfect harmony.

The sad reality is that no mitigation can compensate adequately for the potential damage this Project will inflict on the lives and livelihoods of people downstream. Although Sanpete County has the right to develop additional water supplies, it cannot do so in this way and at such great a cost, costs to be born by the citizens of another county and the many other Utah citizens who recreate there.

The mitigation that the Bureau proposes in the SDIES related to water quality impacts illustrates the flawed logic of the overall mitigation proposal, but it is only the tip of the iceberg. While the SDEIS describes the serious water quality impacts that would occur as a result of the Narrows, it proposes only token mitigation as compensation. Moreover, while the Bureau seems all too ready to discount potential alternatives as speculative or uncertain, it readily embraces speculative and uncertain mitigation as more than sufficient to compensate for Project impacts.

65-25 For example, the Bureau asserts, with little or no critical analysis, that stream bank stabilization and other improvements on Mud Creek can and will compensate for higher concentrations of phosphorus in Scofield Reservoir, even though the Bureau readily admits that similar efforts have failed in the past. *See id.* at S-16. Further, the Bureau concedes that pursuing this option would require either SWCD acquiring private lands or obtaining permission to do major

[12] Available online at: http://www.usbr.gov/lc/region/programs/strategies/FEIS/AppU.pdf.

reconstruction on private lands, *see* S3.11 at S-31, a prospect that is by no means certain. *Cf.* SDEIS at 2-59 (rejecting a proposed alternative because "[t]he concept of land retirement also presupposes that there are willing sellers and willing buyers of land, forbearance, or water rights"). At one point, the Bureau goes even further, stating—without one shred of supporting documentation—that "[i]t is anticipated that, by removing livestock [along Mud Creek], the wetland vegetation would return on its own with little or no other outside measures." SDEIS at 3-66. Mere "anticipation" or "supposition" is no substitute for the kind of rigorous and thoughtful analysis NEPA requires.

Unfortunately, this pattern of band-aid mitigation is repeated again and again over the course of the SDEIS, often by using data selectively. For example, the SDEIS cites State Park visitation data as the basis for evaluating recreational use on Scofield Reservoir. *See* SDEIS at 3-74 ("Scofield State Park receives an annual visitation of about 105,200 visitors. Annual revenues approach $98,400.") Only by selectively citing data in that way can recreational use at the much smaller and more remote Joe's Valley Reservoir be deemed "comparable" to that at Scofield. The problem is, however, that *the two State Park facilities at Scofield account for only a small fraction of recreational use at the Lake, recreational use that includes at least three major cabin developments and miles of shoreline—all heavily used—that are nowhere near the two relatively small state park facilities.* In fact, much of the recreational use in the lake occurs in winter, when the State Parks are not even open.

The SDEIS fails to propose adequate mitigation for adverse impacts to the Scofield Reservoir Fishery and Lower Fish Creek.

Whatever the purported "studies" may say, it defies both reason and experience that a 200-acre headwater impoundment will replace the number of angler hours lost on Scofield Reservoir, a Utah Blue Ribbon Fishery, *see* http://wildlife.utah.gov/blueribbon/waters/scofield.php, with of approximately 2800 acres and 29 miles of shoreline at full capacity, and one the SDEIS itself recognizes as the "the third best flat-water trout fishery in the State." SDEIS at 3-35. The new reservoir, by contrast, would be small, (+/- 600 acres when full) and would regularly empty to approximately 150 acres. It would also be located at a high elevation, and will therefore be frozen for more of the year, reducing usable days for fishermen and boaters. *See* SDEIS § 3.8.1.3.2 at 3-77. Nor does the SDEIS spend much time considering potential impacts to Lower Fish Creek, an important and high-use stream fishery below Scofield Dam.

In addition to the fishery, Scofield Reservoir also supports domestic, recreational and agricultural uses. All of this underscores the need to protect this vital resource, and cast doubt on a Proposed Action Alternative that would, admittedly, degrade water quality, accelerate eutrophication and otherwise threaten this precious resource. *See, e.g., id.* at 3-77 ("Under the Proposed Action, more frequent fishkills and accelerated eutrophication also could degrade the park.").

65-26 Other estimates in the SDEIS suggest an average reduction in the size of Scofield as a result of the Narrrows project vary between 9% and 26%. Nevertheless, anticipated phosphorus reduction under the mitigation for water quality proposed under the Proposed Action is approximately 105 kg/year, *id.* § 3.5.2.2 at 3-55, *only 5% of the necessary reduction to the loading that takes place at current water levels.*

65-27 The SDEIS estimates an increase of nearly 11% in phosphorus in-lake concentration as a result of the Narrows project, *id.* § 3.5.3.2.2 at 3-55, and further states that critically low flushing rates would occur 17% more frequently. *See id.* ("During these periods of critical flushing rate, the probability of fish kills would be somewhat higher.").

65-28 While recognizing these impacts, the Bureau consistently downplays them—often based on supposition or "professional judgment" rather than hard data—and suggests that mitigation in other areas will more than compensate. *See, e.g.,* SDEIS § 3.5.3.2.2 at 3-56 ("Taking into account the slight increase in in-lake phosphorus concentration and essentially no change in flushing rate, professional judgment would indicate that the overall water quality in Scofield Reservoir would be degraded only slightly by the Proposed Action without Mitigation. Mitigation measures to offset this potential impact are described in section 3.5.3.2.6.")

Nevertheless, an examination of Section 3.5.3.2.6 shows that most of the proposed mitigation is nothing but minor revisions to a 6.5 mile section of Mud Creek, a tributary to Scofield that contributes only 29% of the total nutrient input into the reservoir.[13]

65-29 This proposed mitigation is problematic on a number of levels. First the property through which the property flows would have to be purchased from private owners, a costly and uncertain prospect. Second, in many places Mud Creek remains a deeply incised channel with little or overhead cover. The proposed mitigation, however, is the "installation of a series of check dams to raise the water level." SDEIS § 2.2.2.2.4.1 at 2-22, 2-26. No number of such dams is proffered, and discussions of channel are limited to the following statement: "Some minor recontouring may be required at the site." *Id.* at 2-26.

65-30 The SDEIS also recommends proceeding with the project before any realistic analysis has been done with respect to the effectiveness of the proposed mitigation. There is little or no hard data to suggest the approach will deliver the promised benefits, particularly in areas where, as the SDEIS admits, similar efforts have failed in the past.

65-31 TU strongly believes that unbiased and realistic "professional judgment" would indicate that the numbers, on their face, suggest potentially catastrophic consequences of even a minor reduction in water quality. In other words, a small change may have an enormous impact, and yet the proposed mitigation ignores this "tipping point" problem and assumes, without more, that the impacts will be modest and the proposed mitigation successful.

The SDEIS Lacks Adequate Considerations Regarding Public Safety

The only issue of public safety addressed in the SDEIS is increased road traffic on the state highway adjacent to the proposed new reservoir. Nevertheless, the document itself gives examples of clear and present dangers that present themselves on the Carbon County side when water levels drop in Scofield:

> An example of this type of problem occurred during 1992. The lowest water surface elevation at Scofield Reservoir that year was 7,5876 feet with a reservoir captive capacity

[13] *Scofield Reservoir TMDL* at 4.

> of 1,102 acre feet. A major concern was that the reduced water level would lower water temperature, causing ice to form on the lake. This caused the potential for a blockage at the site of the old dam near the middle of the reservoir, not allowing water to pass from the upstream portion of the reservoir to the dam. Channel improvements and an electrical system to prevent freezing around the outlet structures were put in place. Other measures were put on standby in case reservoir levels dropped lower. The crises were finally averted by restricting reservoir releases, ration[ing] irrigation water, eliminating the use of water for lawns and yards, and monitoring water tank levels downstream in Carbon County. While such drought periods are not frequent, they do have significant impacts and would occur more often with implementing the proposed project.

SDEIS § 3.3.3.2 at 3-18. Despite this recognition, the SDEIS addresses no public safety concerns aside from road use issues.

65-32 Scofield remains the primary culinary water source for most of Carbon County's population. Any reduction in volume to this water supply has direct and possibly catastrophic impacts downstream, none of which are addressed in the SDEIS beyond a vague suggestion that Carbon County residents would be out of luck, since the M&I and irrigation water in question was not guaranteed before Scofield dam was raised in the 1940s. *See generally* SDEIS § 3.3.3.2 at 3-19 ("Figure 3-2 also shows that there would be no minimum pool for fishery in Scofield Reservoir had it not been enlarged."). This historic fact, however, cannot trump the present reality that many Utah citizens rely on Scofield not only for recreation, but for irrigation, industry, and drinking water.

65-33 For all these reasons, the SDEIS fails to meet the requirements of NEPA, and the Bureau should not move forward with any of the Proposed Alternatives. The concept remains flawed, the proposed mitigation fundamentally inadequate, and there are far better ways to provide a modest additional supply of irrigation and M&I water to Sanpete County that do not threaten existing and vital water supplies and water resources in Carbon County.

Respectfully submitted,

Michael J. Bertelsen
Trout Unlimited

EXHIBIT A

UDEQ, *Scofield Reservoir TMDL (2000).*

Utah Department of Environmental Quality
Division of Water Quality
TMDL Section

Scofield Reservoir TMDL

Waterbody ID	**Scofield Reservoir, HUC 14060007**
Location	**Carbon County, Central Utah**
Pollutants of Concern	**Total Phosphorus, Dissolved Oxygen**
Impaired Beneficial Uses	**Class 3A: Protected for cold water species of game fish and other cold water aquatic life, including the necessary aquatic organisms in their food chain.**
Loading Assessment **Current Load** **TMDL Target Load** **Load Reduction**	 **6,723 kg/year total phosphorous** **4,842 kg/year total phosphorous** **1,881 kg/year or 28%**
Defined Targets/Endpoints	**1) Shift in phytoplankton dominance from blue-green algae** **2) DO level of no less than 4.0 mg/L in 50% of water column** **3) TSI values between 40-50**
Implementation Strategy	**1) Stream restoration BMP's** **2) Elimination of grazing below**

	high water line of reservoir

Executive Summary

This document is identified as a TMDL for Scofield Reservoir and is officially submitted to the U.S. EPA to act upon and approve as a TMDL for the State of Utah, Department of Environmental Quality (DEQ), Division of Water Quality (DWQ). Scofield Reservoir is a 2,815 acre body of water located in western Carbon County. The watershed is located in Hydrologic Unit Code (HUC) 14060007 and the uses are quite diverse and consist of year-round fishing, agriculture, and coal mining.

Scofield Reservoir is listed as impaired for 3A, cold water fishery. Parameters of concern are total phosphorous concentrations, low winter dissolved oxygen (DO) concentrations and nuisance algal blooms. These parameters have directly and indirectly lead to annual fish kills for several years. The reservoir is a high priority for TMDL completion and will be submitted to U.S. EPA April 1, 2000. Designated beneficial uses are 1C, 2B, 3A, and 4, domestic use, secondary water contact, cold water fish, and agricultural uses, respectively.

Water quality endpoints were chosen which are linked to reduction of total phosphorous from the surrounding watershed. They include: 1) A shift in phytoplankton dominance from blue-green algae to a more diverse phytoplankton community, 2) DO level of no less than 4.0 mg/L in 50% of the water column at the deep end of the reservoir during critical periods (late winter and late summer), 3) TSI values in the range of 40-50. These endpoints are linked either indirectly or directly to achieving Scofield Reservoir's designated beneficial uses.

An acceptable load to Scofield Reservoir was estimated by Denton et al. (1983) as 1881 kg/year. The nutrient load allocation was linked to stream restoration strategies on Mud Creek and Fish Creek drainages which contribute 87% of the total annual phosphorous load to Scofield Reservoir. Denton et al. (1983) estimated that this load reduction would allow achievement of water quality standards and designated beneficial uses of Scofield Reservoir.

Technical analysis for this TMDL consists of regression equations used to calculate Carlson's Trophic State Index (TSI), intensive water quality monitoring conducted in 1997-1998 and the Clean Lakes Phase I and II studies conducted in 1982-1983 and 1990, respectively. A model specific to Scofield Reservoir is being developed to better estimate acceptable nutrient allocations and effects on the TSI. The model may also be used to validate endpoints and recommendation of future pollution control strategies.

The Margin of Safety (MOS) consists of conservative estimates of the endpoints to assure attainment of water quality standards and load allocations associated with pollution control techniques or Best Management Practices (BMP²s). Future efforts will be directed to modeling load allocations and monitoring of Scofield Reservoir in a process of evaluation and refinement of TMDL endpoints.

The acceptable total phosphorous load (1,881 kg/year) to Scofield Reservoir will be allocated to stream restoration of Mud Creek and Fish Creek drainages. Some BMP's include: streambank revetments, installation of gabion check dams, re-seeding and planting of willows in devastated riparian areas, fencing and controlled livestock management techniques.

Public participation for this TMDL consists of the Price-San Rafael Steering committee and associated technical advisory committees. These committees were recently organized and

officially formed to deal with water quality issues in Scofield Reservoir and the Price and San Rafael River basins. The Steering Committee and TAC's consist of Emery and Carbon County Commissioners, SCD board members, BLM, Forest Service, DWQ, DWR, and State Parks and Recreation representatives. These committees have been designated to develop watershed and implementation plans, including funding mechanisms to address water quality issues in Scofield Reservoir and surrounding watersheds. During the Phase I Study a locally administered Steering Committee was in-place to guide and approve the recommendation of the Phase I Clean Lakes Study.

Waterbody description

Scofield Reservoir is a 2,815 acre body of water located in western Carbon County, which is in central Utah (Figure 1). Uses of Scofield Reservoir and its watershed include coal mining, agriculture, residential, fishing, hunting, snowmobiling, camping, and a variety of other types of summer and winter recreation. Scofield Reservoir is fed by several perennial streams (Figure 1), Fish Creek and Mud Creek account for 34,487 and 8,441 acre feet of water, respectively. These two streams account for 87 % of the inflow to Scofield Reservoir (Denton et al. 1983). The reservoir is one of the prime cold water fisheries in the state, both summer and winter because of its close proximity to Salt Lake City. Therefore, Scofield Reservoir is heavily impacted by anglers and other recreational users.

Scofield Reservoir is listed as impaired for a 3A, cold water fishery and the parameters of concern are total phosphorous concentrations and low dissolved oxygen (DO) concentrations, this condition also leads to algal blooms which may be related to seasonal fish kills. Scofield Reservoir is targeted for TMDL development and is considered a high priority in Utah's 1998 303(d) list. A Phase I Clean Lakes study was completed for Scofield Reservoir in 1982. In this report (Denton et al., 1983), it was determined that Fish Creek and Mud Creek accounted for the majority of the nutrient input to Scofield Reservoir, 52% and 29%, respectively. The Utah DEQ/DWQ is considering this TMDL for one pollutant (total phosphorous) because low DO is scientifically linked to high total phosphorous levels. Any reductions in phosphorous loadings will likely improve the DO content in the reservoir. The Utah Division of Wildlife Resources (DWR) has documented fish kills for the last three years (Louis Berg, per. comm.) which has corresponded to blue-green algae blooms which are a result of excess nutrients such as phosphorous. The intent of this TMDL is to reduce the inflow of nutrients in an effort to restore beneficial uses of this water. The result of this action would also improve the recreational aspects (fishing) of Scofield Reservoir.

This TMDL is based on information reported from a Phase I Clean Lakes Report completed in 1983 and as such is a conservative estimate of nutrient loadings to the reservoir. As the implementation of controls or BMP's occur, as outlined in this TMDL, validation or refinement of TMDL endpoints may occur. In addition, modeling of the reservoir and input of new data may also require modification of endpoints or controls to achieve water quality standards.

Water Quality Standards

Beneficial use designation for the waters of Scofield Reservoir are presented in Table 1.

Table 1. Utah Division of Water Quality beneficial use designation for Scofield Reservoir.

Class	Beneficial Use Designation
1C	protected for domestic purposes with prior treatment as required by Utah Department of Environmental Quality
2B	protected for secondary water contact; class
3A	protected for cold water species of game fish, including the necessary aquatic organisms in their food chain
4	protected for agricultural uses such as irrigation and stock watering

The reservoir is listed in the 1998 303(d) for excess total phosphorous and low DO. Although Scofield Reservoir was assessed as fully supporting (1998 305 report) based on numeric water quality criteria (pH, DO, and temperature) during the productivity season (May-Sept.), narrative water quality standards such as depleted winter DO levels, presence of nuisance algae, and documented fish kills show the reservoir as partially supporting its beneficial uses.

Water quality studies conducted in 1990 (Judd, 1992) show blue-green algae comprised 99% of all taxa present, indicating poor water quality conditions. Eutrophication trends for Scofield Reservoir were assessed using Carlson's (1977) Trophic State Index (TSI) and show an increasing trend through 1991, reaching 66.34 indicating a highly eutropic condition. In 1991 rough fish were removed from Scofield Reservoir and the TSI in subsequent years has shown a downward trend, reaching 41.69 in 1995-96, which indicates a mesotrophic condition. More recent (1998-99) data indicate a slight increase in the TSI. It is hypothesized that the removal of rough fish in 1992 was beneficial in that bottom sediments were disturbed less, resulting in decreased release of nutrients into the water column. Throughout this time (from 1991 on) significant blue-green algae blooms were observed and fish kills were documented. The data used to derive TSI values is limited (not collected at the same period of time) and therefore has a relatively high degree of variability which may not reflect actual eutrophication trends for Scofield Reservoir. Recently formed local stakeholder committees have agreed to commit time and resources for a more coordinated water quality sampling. This will lead to a more detailed investigation of the relationship between blue-green blooms and TSI values.

The Scofield Reservoir Phase I and II Clean Lakes Studies (Denton, et al. 1983 and Judd, 1992), have shown blue-green algae blooms are a result of increased nutrients, which are often limited by aqueous phosphorous levels. Therefore, the pollutant of concern for this TMDL document is total phosphorous, because reductions of phosphorous (as a result of implemented TMDL) will limit the blue-green algae and directly alleviate low winter DO conditions and reduce fish kills.

Water Quality Targets/Endpoints

Improvement of water quality in Scofield Reservoir is linked to a reduction of nutrients from the surrounding watershed. We propose to use three endpoints, they include:

1. A shift in phytoplankton dominance from blue-green algae to a more diverse phytoplankton community.

2. DO level of no less than 4.0 mg/L in 50% of the water column at the deep end of the reservoir during critical periods (late winter and late summer).
3. TSI values in the range of 40-50.

A major factor in restoring Scofield Reservoir's beneficial use (cold water fishery) is reducing the blue-green algae blooms and either directly or indirectly improving the DO levels throughout the year. At this time we feel the best endpoint would be to measure the dominance of blue-green algae when they appear to be the most problematic, which is during the productivity period, May through September. Qualitative samples would be taken throughout this period to determine dominance of blue-green algae. The shift from dominant blue-green algae to increased diatoms and green algae would be an indicator of reduced total phosphorous levels in Scofield Reservoir.

The second endpoint that will be linked to nutrient reduction in Scofield Reservoir is DO concentrations no less than 4.0 mg/L in 50 % of the water column during the critical periods (late summer and late winter). This endpoint is directly linked to the protection and survival of cold water fish species (Louis Berg, per. comm.) and therefore to attainment of one of Scofield Reservoir's designated beneficial uses (Table 1). Utah's Division of Wildlife Resources (DWR) has shown that a DO concentration of less than 5.0 mg/L has lead to mortality of cold water fish in lakes and reservoirs. A DO concentration profile will be measured at one meter intervals at the deep site in Scofield Reservoir to determine this endpoint.

The third endpoint, a TSI in the range of 40-50 is directly linked to nutrient levels in Scofield Reservoir. This endpoint takes into account chlorophyl-a, secchi depth, and total phosphorous concentrations which are a direct measure of the nutrient levels in Scofield Reservoir. These water quality parameters (chlorophyl-a, secchi depth, and total phosphorous concentrations) can be measured when the blue-green algae samples are taken. This sampling coordination will increase the validity of the TSI values on an annual basis.

Water quality samples for chlorophyl-a, total phosphorous, and secchi depth will be taken semi-annually (May and Sept) at STORET sites 593098, 593099, and 593100 (Figure 2). The type of sampling will consist of grab samples. Phytoplankton samples and DO concentrations will be taken only at the deep site (STORET 593100). During implementation of BMP's a more rigorous sampling protocol will be developed to track progress towards water quality goals.

TMDL

Based on data in the Phase I Clean Lakes report (Denton et al., 1983), the total phosphorous acceptable load allocation for Scofield Reservoir is 4,842 kg/year. This is based on all inputs to the reservoir (Figure 1; Table 2). The load reduction is 1881 kg/year which is a 28% reduction of nutrients from non-point sources to Scofield Reservoir. The reduction of total phosphorous was linked to implementation of several stream restoration strategies (Table 3). Denton et al. (1983) projected that designated beneficial use and water quality criteria would be achieved by this plan of action.

In support of this phosphorous reduction plan, several other concepts were developed outside of the scope of this plan that would also control nutrient reduction in Scofield Reservoir. They included the following:

1. Developing and implementing livestock grazing management plans.
2. Planning of recreational development, providing an improved sewer disposal system.

3. Controlling of surface disturbance activities and solid waste disposal.

Although Fish Creek contributed 53% of the phosphorous loading to the reservoir, it was not selected as the primary area for streambank restoration due to lack of local cooperation, extremely steep, and unstable streambanks. However, the following restoration techniques were applied and total phosphorous was linked primarily to suspended solids.

1. Approximately 3,300 feet of fencing was installed to protect area from further deterioration from livestock and vehicular travel.
2. Some eroded area within the above enclosure were filled, sloped, and re-seeded for stabilization.

Based on the Clean Lakes Study I (1983) the implementation of proposed Mud Creek Project would reduce total phosphorous loading to Scofield Reservoir by 500kg/year. The project consisted of installation of gabion check dams, bank stabilization using Juniper revetments, re-vegetation and establishment of riparian habitat, and enclosure of project by fencing.

The Phase II Clean Lakes Study (1990) concluded that insufficient data exists to confirm the effectiveness of these stream restoration activities in reducing phosphorous loads to Scofield Reservoir. The data, although limited, does show a slight reduction in total phosphorous levels after stream restoration had taken place. One possible reason may have been that fencing of a significant portion of Mud Creek was not completed and no livestock grazing management was instituted due to landowner conflicts.

Currently a model that will be used to determine more scientifically acceptable load allocations based on long term water quality data, reservoir morphology and morphometery is being developed. The Clean Lakes Phase II report also concluded that internal phosphorous loading may also be occurring in the winter. The model under development will include attempts to show internal phosphorous loading and its effects on eutrophication of Scofield Reservoir. This model either validate or modify current projections of nutrient loading allocations and thereby implement control actions which will attain designated beneficial uses for Scofield Reservoir. The model coupled with an ongoing monitoring plan will act as the margin of safety required under the TMDL guidelines. As information is acquired the TMDL may be modified according to the information obtained.

Table 2. Stream and reservoir restoration techniques and nutrient load allocations for Scofield Reservoir (Clean Lakes Phase I, Denton et al. 1983 report).

Restoration Technique or Alternative	Estimated Phosphorous removal (kg/yr)	Public Benefits	Water quality Benefits	Public Acceptance	Feasibility
Stream restoration on private lands (Mud Creek)	500	Good	Great	Good	Feasible
Improved recreation facilities	200	Moderate	Little	Good	Feasible
Law enforcement	50	Good	Little	Good	Feasible
South shore wetland project	481	Good	Moderate	Good	Feasible
Enforcement fish entrails disposal	50	Good	Moderate	Good	Feasible
Fish Creek restoration	500	Good	Excellent	Good	Less Feasible
Fish cleaning station	100	Good	Moderate	Good	Feasible
Total estimated phosphorous reduction	**1881**				

Significant sources

The Utah Division of Water Quality completed a study of Scofield Reservoir and its watershed through an EPA Clean Lakes Phase I study in 1983. The study identified the sources of pollution and determined that phosphorus and nitrogen were both limiting nutrients. However, recommended remedial action for lake restoration was directed towards a reduction of phosphorus within the watershed.

Denton and others (1983) determined external phosphorus contributions to the reservoir as shown in Table 3. Fish Creek contributes 52% (3508 kg/year) and Mud Creek contributes 24% (1613 kg/year) of all external phosphorus loads. The remaining tributaries, shoreline wash, and precipitation contribute 24% of the external phosphorus load. Slightly higher loading values with similar distributions were reported by Waddell and others (1983) for the 1979-80 water year.

The external sources of phosphorus include stream sediments, sewage, and agricultural wastes. In an effort to reduce human waste a centralized leech field system was put in place for the town of Scofield in 1983. However, erosion and agricultural practices continue to be a problem. Sediment release by erosion in the watershed contributes to a large fraction of the phosphorus load into the reservoir. Intensive livestock grazing in the watershed, grazing within the riparian zones (stream banks), in particular in close proximity to the reservoir, road construction, summer home construction, and mining activities have all accelerated the erosion process.

Table 3. Annual Phosphorus contributions from sub-basin areas

Sub-basin	Annual Total Phosphorus Load (kg/year)
Fish Creek (FCI)	3508
Mud Creek (PVC-1)*	158
Mud Creek (PVC-2)*	528
Mud Creek (PVC-3)*	249
Mud Creek (PVC-4)*	323
Mud Creek (PVC-5)*	115
Mud Creek (PVC-6)*	240
Pondtown Creek (PC-1)	488
Woods Canyon Creek (WC-2)	172
Miller Canyon Creek (MC-1)	66
Dry Valley Creek (DVC-1)	89
Eccles Creek (EC-1)	337
Shoreline Wash (SW-1)	308
Precipitation	142
TOTAL	**6723**

* The drainage was subdivided and annual loadings determined for each sub-basin. Total load for Mud Creek minus Eccles Creek was 1613 kg/year.

The Manti LaSal National Forest has completed a water resource inventory for the Price River watershed. Data were compiled on 72,359 acres in and around the National Forest. Sediment yields were estimated and watershed improvement needs were identified. The work on these ongoing improvements need to be accelerated. Of the land surveyed 7257 acres or 10.1 percent of the watershed was classified with high to extreme erosion potential. Water quality in the streams based on suspended sediments was estimated to range from 52 mg/L in the Fairview Lakes to 276 mg/L in Mud Creek. Anything above 100 mg/L is considered high or very poor water quality. Erosion is the major source of pollution into Scofield Reservoir. Sediment and sediment related nutrients are primary reasons for the deteriorating water quality in the reservoir.

In addition to phosphorus loads from external sources the resuspension of phosphorus from lake sediments back into the water column is occurring. Internal loading of phosphorus involves chemical interactions within the reservoir. Since the reservoir was constructed in 1946, sediments

have been deposited on the reservoir bottom. These sediments contain phosphorus that is stored in different chemical forms. The phosphorus is bound to other elements (iron and calcium) forming phosphate salts. However, when the lake stratifies water from the hypolimnion (bottom) does not mix with the surface water and dissolved oxygen in the hypolimnetic water column is used to oxidize organic materials. Eventually the hypolimnion becomes anoxic. Under these conditions phosphate salts break down and the phosphorus is released into the water column. At turnover, when the water in the reservoir mixes in the spring and fall, this rich source of phosphorus becomes available for algal production. Dissolved oxygen studies indicate that internal phosphorus loading may be higher than was previously expected (Judd, 1992).

Technical Analysis

The technical analysis for this TMDL consists of regression equations (1-3) used to derive TSI values, intensive water quality monitoring conducted in 1997-1998, and Clean Lakes Phase I and II studies conducted in 1982-1983 and 1990, respectively. Nutrient load allocations for this TMDL were estimated based on the Clean lakes Phase I and II reports (Denton et al., 1983). A water quality model specific to Scofield Reservoir is being developed to better estimate nutrient allocations and effects on the TSI. At this time the model is not complete, but will be used in validation of endpoints and recommendation of phosphorous control strategies if needed for Scofield Reservoir. The model will be completed by May 2000 and will be used to better define load allocations for Fish Creek and Mud Creek.

1. TSI = 60 - 14.41 ln Seechi Depth
2. TSI = 9.81 ln Chl A + 30.6
3. TSI = 14.42 ln Total Phosphorous + 4.15

Margin of Safety and Seasonality

The margin of safety (MOS) for this TMDL is built into the load allocations in the Phase I and II Clean Lakes Report. The pollution control techniques or BMP's were a conservative approach to attainment of designated beneficial uses for Scofield Reservoir. Selection of endpoints has a MOS built into them, for example, the reduction of blue-green algae will be attained by a simple shift in dominance, the DO concentration of 4.0 mg/L in 50% of the water column allows for a sufficient niche for fish during winter as the hypolimnion (O^2 deficient) increases, and the TSI has a wide range (40-50) which equates to mesotrophic conditions.

Using the concept of adaptive management, as BMP's are implemented annual water quality monitoring and analysis of TMDL endpoints will provide information that will allow mid-course management changes to be made that assure water quality goals are met.

The choice of endpoints also takes into account seasonality of the TMDL. Blue-green algae blooms due to increased nutrients predominantly occur in late summer and fall. The DO concentration profile will be measured in summer and fall. The TSI will also be calculated on data taken throughout the productivity season (summer and fall).

Allocation of Load Reductions or Management Strategies

The specific recommendation of the Phase I study included the following stream restoration elements:

1. Implementation of stream restoration and streambank stabilization for Mud Creek and Fish Creek.
2. Construction of a public fish cleaning station.
3. Development of a public education and awareness campaign.
4. Chemical treatment for internal nutrient loading (contingent on future modeling results).

The majority (79%) of total phosphorous load reductions (Table 2) to Scofield Reservoir will be allocated by continuing with stream restoration projects on Mud Creek and Fish Creek. Based on the report by Denton et al., 1983, the implementation of stream restoration will result in a total phosphorous load reduction to Scofield Reservoir of 1881 kg/year and represents a 28% reduction of non-point source pollution. Due to extremely steep banks in the Fish Creek drainage stream restoration efforts will be directed to Mud Creek drainage (see TMDL section). The other load allocations are specific to management of recreation facilities (managed by State Parks and Recreation) at Scofield Reservoir, such as enforcement of fish entrails disposal, fish cleaning stations, improved recreation facilities. The Phase II Clean Lakes report documented that attainment of load reductions has not occurred due to incomplete implementation of restoration practices. Loading estimates included in this TMDL still can be achieved through adequate implementation of BMP's in the Scofield Reservoir watershed.

The south shore wetland project would reduce total phosphorous to the reservoir significantly, approximately 481 kg/year (Table 2). This project consists of reducing nutrient inputs associated with livestock grazing by fencing off a portion of the south shore of the reservoir. Based on a livestock model developed by Natural Resources Conservation Service (NRCS) in Utah this load allocation (481 kg/year) is thought to be underestimated. The NRCS livestock model indicates a total phosphorous load allocation of 674 kg/year. At this time we do not know the livestock grazing allotment on the south shores of the reservoir, therefore, we are basing the load allocation on 100 head of livestock grazing on the south shore for 180 days per year. This equates to a 10% (193 kg/year) difference for the total load allocation. This difference will be part of the TMDL's MOS as well.

One element of the Scofield Reservoir water quality model is an internal nutrient loading factor. If this model suggests internal loading of nutrients is a significant factor, other nutrient load reduction plans will need to be developed, such as P-inactivation by chemical means. This will only be done when all other nutrient reduction efforts have been completed and subsequent data shows significant internal nutrient loading. The TMDL will be modified if this is the case.

Implementation of these projects has recently been taken up by organized local stakeholder committees to develop a watershed management plan. One priority of the Price River Technical workgroup will be to mediate landowner conflicts in the Scofield Reservoir watershed and secure 319 NPS funds and other funding to implement these nutrient load allocation projects.

Public Participation

Public participation for this TMDL consists of the Price-San Rafael Steering committee and associated technical advisory committees. These committees were recently organized and officially formed to deal with water quality issues in Scofield Reservoir and the Price and San Rafael River basins. The Steering Committee and TAC's consist of Emery and Carbon County Commissioners, SCD board members, BLM, Forest Service, DWQ, DWR, and State Parks and Recreation representatives. These committees have been designated to develop watershed and implementation plans, including funding mechanisms to address water quality issues in Scofield Reservoir and other impaired waters in surrounding watersheds. During the Phase I Study a locally administered Steering Committee was in-place to guide and approve the recommendation of the Phase I Clean Lakes Study.

The notice of this TMDL was published one time for a 30 day comment period in the Salt Lake Tribune and Deseret News. The TMDL was also available in its entirety on the State of Utah DEQ-DWQ web page (http://www.eq.state.ut.us) for thirty days. No public comments were received.

References

Denton, R.L., M.I. Cox, L.B. Merritt. 1983. State of Utah Scofield Reservoir Phase I Clean Lakes Study. Dept. of Health , Div. Of Environmental Health, Bur. Of Water Pollution Control, SLC, UT 84103.

Judd, H.L. 1990. Scofield Reservoir Restoration Through Phosphorous Control Dept. of Environmental Quality, Div. Of Water Quality, SLC, UT 84103.

EXHIBIT B

A kinetic approach to the effect of temperature on algal growth.
Goldman & Carpenter, Woods Hole Oceanographic Institution (1973)

A kinetic approach to the effect of temperature on algal growth[1]

Joel C. Goldman and Edward J. Carpenter
Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543

Abstract

A simple model incorporates the combined effects of temperature and nutrient limitation on the growth rate of algae. The temperature function is described by the Arrhenius equation and the nutrient relationship with the Monod model. The Arrhenius equation is inserted into the Monod model for the maximum growth rate $\hat{\mu}$, so that the growth rate is described by the product of temperature and nutrient expressions.

The utility of the Arrhenius equation in describing the effect of temperature on $\hat{\mu}$ for phytoplankton is tested with data from the literature on continuous culture experiments with freshwater and marine algae; the Arrhenius model describes the relationship between $\hat{\mu}$ and temperature extremely well. Several restrictions to widespread use of the model limit its application to laboratory studies, but its general concepts may apply to natural water situations.

The need for quantitative data on the effect of temperature on phytoplankton growth is evident if we are to assess both the role of temperature in natural waters (Eppley 1972) and the impact of thermal pollution (Patrick 1969).

Attempts to model nutrient effects on algal growth rates by using the Monod model have been reasonably successful (Dugdale 1967; Eppley et al. 1969; Paasche 1973; Goldman et al. 1974). A basic assumption governing the use of this model is that the growth rate of an alga is dependent solely on the concentration of a particular limiting nutrient. Thus, the Monod model is described as

$$\mu = f(s) = \hat{\mu}\left[\frac{S}{K_s + S}\right] \qquad (1)$$

in which μ = specific growth rate, day^{-1} (base e); $\hat{\mu}$ = maximum specific growth rate, day^{-1} (base e); S = limiting nutrient concentration, mg liter^{-1}; and K_s = half saturation coefficient, mg liter^{-1}.

By necessity during nutrient uptake studies other variables that affect growth rates, such as light intensity and temperature, are either held constant, as in laboratory cultures, or are considered to have a constant effect, as during the course of a field experiment. Although such simplified assumptions are necessary for the models to be used, their applicability is thereby restricted in describing the response of algae to the range of environmental conditions in natural waters. Also, use of the simplistic Monod model permits no consideration of the interdependency of environmental factors affecting the uptake of nutrients by phytoplankton. For example, Eppley and Sloan (1966) found that the effects of light and temperature on algal growth rates were interrelated; Eppley and Strickland (1968) and Middlebrooks and Porcella (1971) have discussed the importance of the interactions between light intensity, temperature, and nutrient concentration on algal growth rates. Yet there have been only a few attempts to model these interactions in a quantitative fashion (DiToro et al. 1971; MacIsaac and Dugdale 1972).

We have developed a relatively simple model in which the effect of temperature on algal growth rates is incorporated into a product expansion of the Monod model. With this new model the combined effects of temperature and nutrient limitation can be described. We thank J. H. Ryther and H. W. Jannasch for their critical review of this manuscript.

Concepts of the model

The maximum growth rate as defined by the Monod relationship, although not

[1] Contribution No. 3234 from the Woods Hole Oceanographic Institution. This investigation was supported in part by National Science Foundation Grants GI-32140 and GA-37993.

dependent on the limiting nutrient concentration, is still a function of other environmental variables such as light and temperature. When light intensity is held constant, it is possible to describe the maximum growth rate solely as a function of temperature by applying the Arrhenius equation. Then

$$\hat{\mu} = Ae^{-E/RT} \tag{2}$$

in which A = constant, day^{-1}; E = activation energy, cal mole^{-1}; R = universal gas constant, cal °K^{-1} mole^{-1}; and T = temperature, Kelvin scale, °K.

By substituting equation 2 into equation 1 we have

$$\mu = Ae^{-E/RT}\left[\frac{S}{K_s + S}\right]. \tag{3}$$

The specific growth rate is now dependent on both temperature and limiting nutrient concentration.

The Arrhenius equation is used here to describe the temperature function only for lack of a more fitting relationship, and because intuitively it would appear that algal growth rates, involving many biochemical reactions, would follow the van't Hoff rule: that is, biological reactions should approximately double for each 10°C rise in temperature. Restrictions to its general use are quickly apparent. First, for each algal species the Arrhenius relationship is applicable only in a definite temperature range (Sorokin 1960). Second, there is evidence of a strong interaction between light intensity and temperature: for example, Sorokin (1960, 1971) has found that for a given temperature the activation energy decreases with increasing light energy; Shelef (1968) has shown that the saturation light intensity is highly temperature dependent. And third, the half saturation coefficient for nutrient uptake is very sensitive to changes in temperature (Shelef et al. 1970). Thus a more general relationship than described by equation 3 would be

$$\mu = Ae^{-E(L)/RT}\left[\frac{S}{K_s(T) + S}\right] \tag{4}$$

in which $K_s(T)$ = temperature dependent half saturation coefficient, mg liter^{-1}; and $E(L)$ = light dependent activation energy, cal mole^{-1}.

A further complication in the effect of temperature on algal growth is the possible temperature dependency of at least two other important parameters controlling nutrient uptake and net algal growth: the yield coefficient (Y) and the decay coefficient (k_d). Only minor variations in Y, defined as the biomass produced per mass of limiting nutrient assimilated, were found for nitrate limited continuous cultures of a high and low temperature strain of *Chlorella* (Shelef et al. 1970). These results were duplicated by Topiwala and Sinclair (1971) in a continuous culture study of the bacterium *Aerobacter aerogenes*. Thus Y may be relatively insensitive to temperature changes, although the exact effect of temperature on this growth parameter is not yet known.

Little information is available for k_d, defined as the factor describing all biological processes leading to a decrease in algal biomass (i.e. respiration, release of extracellular organic compounds, death, etc.). Ryther and Guillard (1962) have shown that dark respiration is highly temperature dependent and varies considerably from one algal species to the other.

The perhaps impossible task of determining temperature dependent coefficients such as $K_s(T)$, $Y(T)$, and $k_d(T)$ in natural systems may restrict application of the model to well defined laboratory studies. It should be possible to determine the temperature dependency of these growth parameters in unialgal experiments. In continuous culture experiments with temperature held constant, Shelef (1968) and Goldman et al. (1974) described these coefficients for several limiting nutrients. Unfortunately, there have been no attempts to model temperature effects in continuous culture algal studies, although Topiwala and Sinclair (1971) were able to develop relationships for $\hat{\mu}$, K_s, and k_d as functions of temperature for *A. aerogenes*, and Shelef

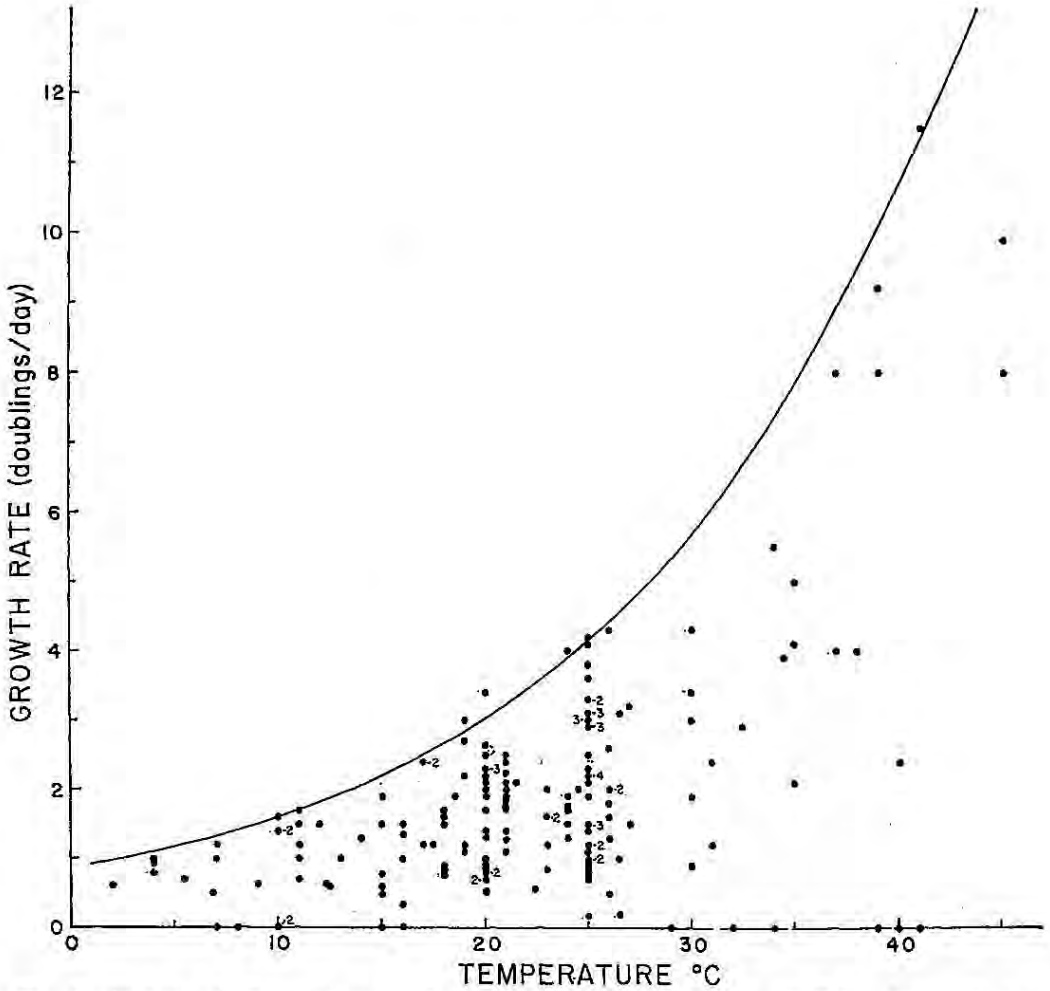


Fig. 1. Variation in the specific growth rate (μ) of photoautotrophic unicellular algae with temperature. Data are all for laboratory cultures. Growth rate is expressed in doublings per day (from Eppley 1972).

et al. (1970) showed that $\hat{\mu}$ and K_s increased with increasing temperatures for *Chlorella*.

Temperature effects on maximum growth rate

One parameter in this model that can be analyzed with existing laboratory data is the relationship between $\hat{\mu}$ and temperature. Eppley (1972), in his review of temperature effects on marine algae, plotted data compiled by Hoogenhout and Amesz (1965) for growth rate versus temperature from a large number of batch culture studies of freshwater and marine algae. An enveloping curve appeared to describe $\hat{\mu}$ in doublings/day as a function of temperature ($< 40°C$) for the composite of all the algal species (Fig. 1). This curve is defined by the relationship

$$\hat{\mu}_2 = 0.851(1.066)^t \qquad (5)$$

in which $\hat{\mu}_2$ = specific growth rate (base 2), doublings day^{-1}, t = temperature, °C, and represents a Q_{10} of 1.88.

Following Eppley's approach, we compared data for $\hat{\mu}$ and temperature from

Table 1. Maximum growth rate versus temperature data from continuous culture experiments on freshwater and marine algae.

Algal Species	Temp (°C)	Maximum growth rate* μ_e - day^{-1}	Presumed limiting nutrient	Reference
		Freshwater algae		
Chlorella pyrenoidosa (Emerson strain)	19	1.36	NH_4^+	Shelef et al. (1970)
	19	1.45	NO_3^-	Shelef (1968)
	25	1.95	PO_4^{3-}	Zabat (1970)
	25	2.14	PO_4^{3-}	Zabat (1970)
	28.5	1.84	NH_4^+	Shelef et al. (1970)
	28.5	2.22	NO_3^-	Shelef (1968)
Chlorella pyrenoidosa (TX 71105)	35	3.94	NH_4^+	Shelef et al. (1970)
	35	4.32	NO_3^-	Shelef (1968)
	39.2	4.26	NH_4^+	Shelef et al. (1970)
	39.2	5.65	NO_3^-	Shelef (1968)
Chlorella sp.	25	1.88	NO_3	Williams (1965)
Selenastrum capricornutum	24	1.85	PO_4^{3-}	Toerien et al. (1971)
	27	2.45	C	Goldman et al. (1974)
Scenedesmus quadricauda	27	2.29	C	Goldman et al. (1974)
		Marine algae		
Skeletonema costatum	19	1.27	V_{B12}	Droop (1970)
Thalassiosira pseudonana (13-1)	13.5	0.48	PO_4^{3-}	Fuhs (1969)
	18	1.14	PO_4^{3-}	Fuhs (1969)
	24	1.46	PO_4^{3-}	Fuhs (1969)
	25	2.09	NO_3^-	Caperon & Mayer (1972)
Thalassiosira pseudonana (3H)	20	2.77	Si	Paasche (1973)
	16	1.34	V_{B12}	Swift (1967)
Nitzschia actinastroides	23	2.06	PO_4^{3-}	Soeder et al. (1971)
Monochrysis lutheri	19	0.84	V_{B12}	Droop (1968)
Dunaliella tertiolecta	15	0.80	Fe	Davies (1970)
	25	1.83	NH_4^+	Caperon & Meyer (1972)
Coccochloris sp.	25	2.16	NO_3^-	Caperon & Meyer (1972)

*$\hat{\mu}$ values are to the base e.

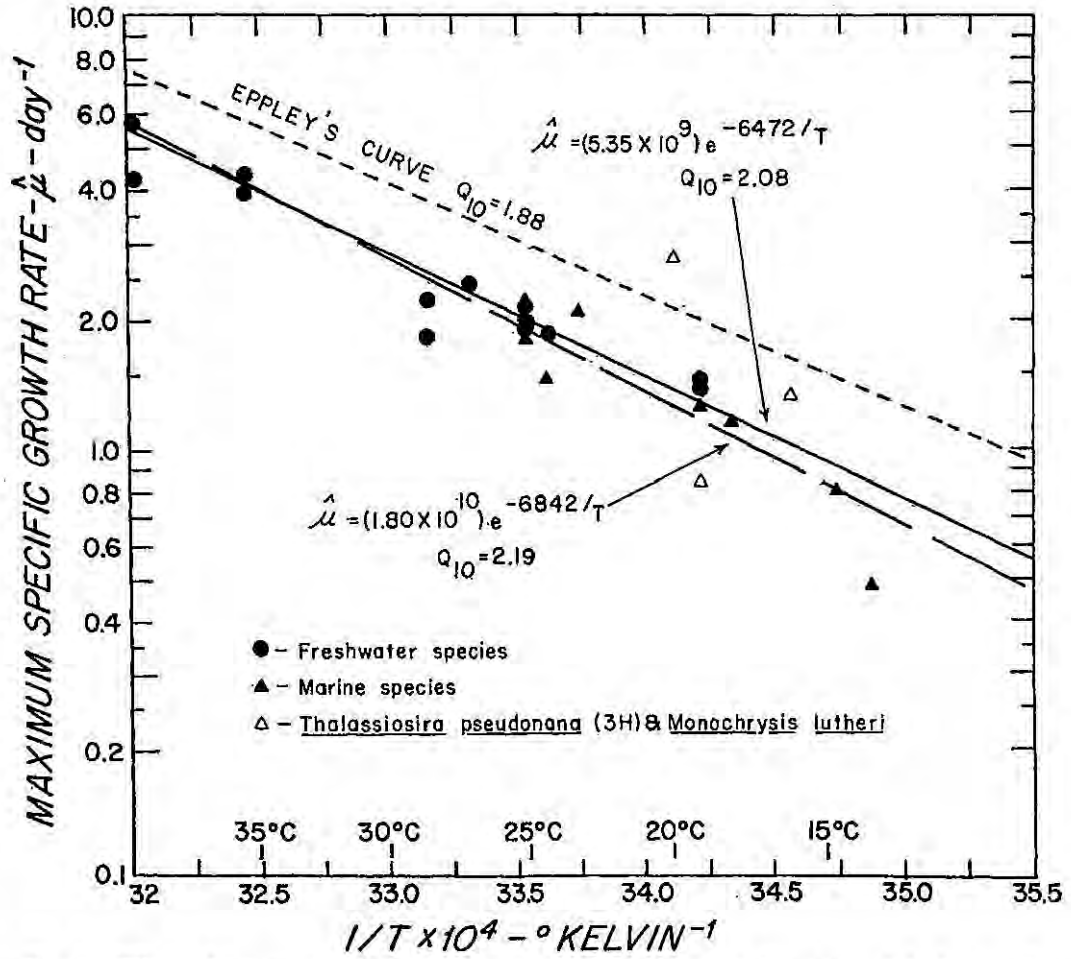


Fig. 2. Effects of temperature on the maximum specific growth rate of marine and freshwater algae grown in continuous culture.

previous continuous culture studies with marine and freshwater algae (Table 1); also included are the presumed limiting nutrients in the different studies. We then plotted $\log_e \hat{\mu}$ against $1/T$ (Fig. 2). The strong correlation between these parameters suggests that the growth rate of many freshwater and marine algae is controlled by some master reaction. Linear regression analysis of all of the data gave a correlation coefficient (r value) of 0.903 and the slope was significant at the 0.001 level. This curve is described by the equation

$$\hat{\mu} = (5.35 \times 10^{9})e^{-6472/T} \qquad (6)$$

This equation represents a Q_{10} of 2.08. It is remarkable that data from so many independent investigations should be in such agreement: if experimental conditions were the same for all the studies, the significance of fit in Fig. 2 might be even more striking.

It is interesting that Eppley's relationship (dashed line in Fig. 2), although having a slope, or Q_{10}, similar to ours, is displaced about one full $\hat{\mu}$ value above our median line. We do not know why $\hat{\mu}$ values from his analysis of batch culture data should be greater than those from continuous culture studies for essentially the same environ-

mental conditions. However, the important point is that it does appear possible to model the effect of temperature on algal growth rates mathematically; refinements of Eppley's model and ours will undoubtedly come when more growth rate and temperature data from batch and continuous culture studies for a variety of algal species become available. And more important, these relationships appear to be valid for many species of marine and freshwater algae. The implication of both sets of findings is that natural populations of phytoplankton may respond to temperature variations in a standard fashion; a model with good values for the coefficients may thus be useful in approximating the role of temperature in controlling phytoplankton production.

We are fully aware that the model leaves many questions unanswered and raises several new ones. As an example, equation 6 does not appear to hold for two of the species represented in Fig. 2, *Thalassiosira pseudonana* (= *Cyclotella nana*)-3H and *Monochrysis lutheri*. Both points for *T. pseudonana*-3H fall significantly above the curve and the one point for *M. lutheri* falls below. Unfortunately, no other continuous culture data are available for these species. *Thalassiosira pseudonana*-3H, on the evidence of the steep slope established by the two points, may have a much higher Q_{10} than that described by the curves in Fig. 2. Because all the species represented in Table 1 except *M. lutheri* are either green algae or diatoms, it may be that equation 6 is not valid for other taxa.

Excluding the data points for *T. pseudonana* 3H and *M. lutheri*, we obtain a linear regression line with an r value of 0.954 and again significance at the 0.001 level. This curve, shown by a broken line in Fig. 2, is described by the equation

$$\hat{\mu} = (1.80 \times 10^{10}) e^{-6842/T}. \qquad (7)$$

Most of the algae represented in Figs. 1 and 2 are small single-celled species, undoubtedly because the small species are most easily grown in the laboratory. Possibly $\hat{\mu}$ data for the larger species would fall below the curves in Fig. 2, due to their seemingly lower growth rates under natural conditions, their presence in colder waters, and the dominance of smaller species in warmer waters (Ryther 1969; Eppley 1972); thus the larger species, both freshwater and marine, might have a composite temperature curve similar to that of the smaller species, but with lower values for the coefficients A or E (or both) in equation 2.

Application and limits of the model

It is apparent that an increase in water temperature, such as that resulting from the discharge of heated effluents, can lead to increased algal growth rates. As water temperatures increase more, growth of a particular species may be slowed or terminated and changes in species composition can occur.

Through application of equation 2 we can show graphically how temperature can play a role in determining species succession. In the four cases depicted in Fig. 3 the importance of coefficients A and E of equation 2 becomes clear. In the first case (Fig. 3A) the values of A and E for alga B are greater than for alga A. If all environmental conditions were optimum, then above temperature T_2 representing the intersection of the two curves, alga B, because of its higher $\hat{\mu}$ value, would be the successful competitor; below T_2 alga A would dominate.

The second situation (Fig. 3B) shows how two species can have virtually the same coefficients but distinctly separate temperature ranges for optimum growth. The situations represented in Figs. 3C and 3D are variations of this general case. In Fig. 3C, although both algal species have the same temperature range for maximum growth and equal Q_{10} values, alga B, because it has a greater value for A, would have a higher growth rate at all temperatures in this range. In Fig. 3D, alga B has a more restricted temperature range for optimum growth than alga A. It can outcompete alga A only until its thermal limit is reached and its growth rate is adversely

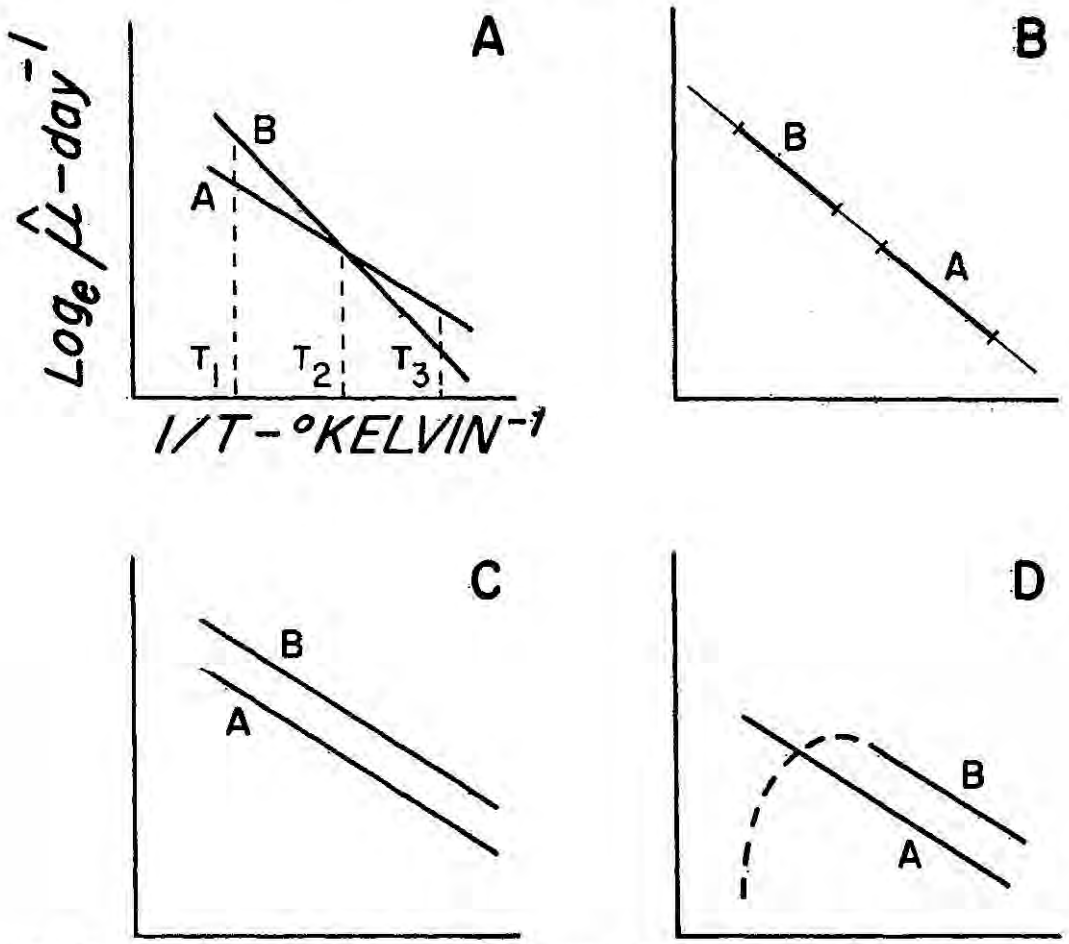


Fig. 3. Four situations in which the effect of temperature can affect competition between two algal species.

affected. Alga A would then be free to grow without competition from alga B.

Unfortunately, little information other than that described in Figs. 1 and 2 is available to compare temperature effects on different algal species. General temperature data from a number of studies, however, suggest that the situations depicted in Fig. 3 occur commonly in nature. For example, Eppley (1972) suggested that 40°C appears to be the upper limit at which his model is valid. This conclusion is consistent with the fact that the temperature of few natural waters exceeds this value, and the growth characteristics of algae most likely have evolved in adaptation to local environmental conditions. An important example of acclimation to temperature is found in the thermophilic blue-green algae able to thrive at temperatures up to 73–74°C in hot springs (Brock 1967) These thermophilic species do not appear as competitors in most natural waters because their lower temperature limits for growth are about 30–35°C (Castenholz 1969), temperatures seldom exceeded even in waters affected by thermal pollution.

It is possible that in aquatic environments warmed either naturally or by power plant effluents and other heated wastes we would observe increases in algal growth rates and even changes in species

composition to more thermophilic types. It is difficult to predict the change in species composition solely from temperature-growth rate data obtained in unialgal laboratory experiments, because with a change in temperature all biological, chemical, and physical processes that, in turn, affect the life of an algal cell are changed (Drost-Hansen 1969). For examples, Smayda (1969) found that the marine diatom *Detonula confervacea* displayed a peak $\hat{\mu}$ at 12°C in the laboratory, but yet it is most abundant in the Narragansett Bay estuary at 1°C, and Braarud (1961) showed that *Asterionella japonica* and *Thalassiosira nordenskioeldi* also had quite different temperature optima for growth in the laboratory than in the field. Carpenter (1973) noted that *Peridinum triquetrum*, which blooms in the Pamlico River estuary during spring when water temperatures are between 2° and 8°C, was significantly more abundant in heated pools of estuary water (10–27°C) than in control pools (5–19°C) of the same water; obviously, factors other than temperature are responsible for the disappearance of this dinoflagellate in nature after the spring bloom.

Pannel et al. (1962), Hockley (1963), and Morgan and Stross (1969) observed increased phytoplankton production in waters warmed by thermal power plant discharges, but gave little information relating temperature effects to species composition. Buck (*cited in* Merriman 1970) found the dominant diatom *Melosira ambigua* to be replaced by blue-green algae in the immediate vicinity of the discharge canal of the Connecticut Yankee nuclear power plant on the Connecticut River, consistent with Cairns' (1956) observations that the natural progression of freshwater algal species is from diatoms at 20–30°C to green algae at 30–35°C to blue-green algae above 35°C.

Clones of the same species isolated from different geographical regions have been shown to respond quite differently to temperature. Guillard et al. (1974) determined that the $\hat{\mu}$ value of five clones of *Skeletonema costatum* increased from 0.17 day^{-1} at 0°C to 1.52 day^{-1} at 28°C and ceased at 31°C in batch cultures. In contrast, Hulburt and Guillard (1968) found that the closely related *Skeletonema tropicum* had a $\hat{\mu}$ value of 2.07 day^{-1} between 25°C and 35°C, with growth ceasing both below 13 °C and above 35°C. Because this species is typical of warm water, it is not found along the coast of the United States north of the Cape Hatteras–Chesapeake Bay area where winter water temperatures fall below 10°C, and where *S. costatum* is found year round. They could not observe any growth at low temperatures for clones of a number of common marine diatoms isolated from off the coast of South America; clones of these same species isolated from off the coast of Cape Cod, Massachusetts, however, grew well down to 3–4°C. Guillard and Ryther (1962) found a similar growth rate pattern in *Thalassiosira pseudonana*: clone 13-1, isolated from the Sargasso Sea, grew well up to 25°C, but not at all below 15°C, whereas clone 3-H, isolated from the embayments of Long Island, New York, had a temperature range of 4–25°C for good growth. Thomas (1966) demonstrated that two isolates of *Gymnodinium* from tropical waters grew best in the temperature range 23–29°C, but would not grow below 15°C. Species of *Chaetoceros* and *Nannochloris* isolated from similar tropical waters would not grow below 10°C, but displayed good growth up to 37°C.

Multiplicative growth model

So far we have limited our discussion to a consideration of temperature effects on algal growth rates and species competition. Obviously, many factors including light, nutrients, predation, and sinking combine in multiplicative fashion to affect algal growth. Descriptive models encompassing these and other factors have met with limited success because data were insufficient to describe the individual coefficients (DiToro et al. 1971). However, even though good data are lacking, multiplicative models such as equation 3 may provide insight into the way in which the relative magni-

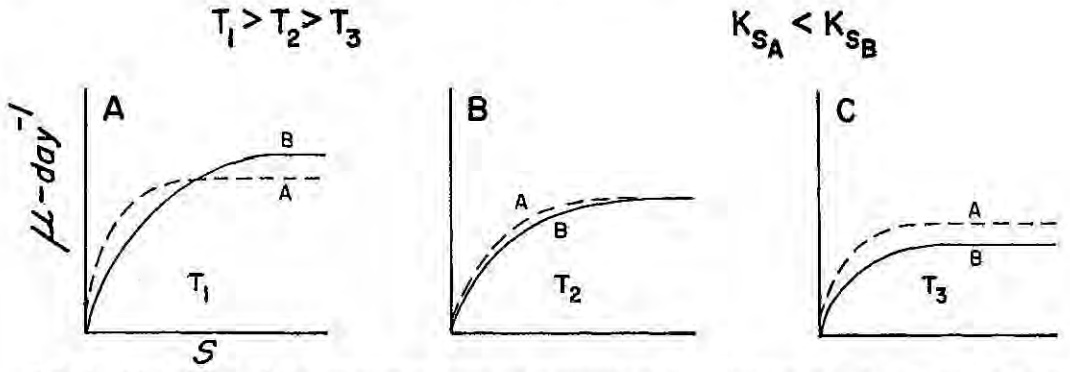


Fig. 4. The effects of the interaction between temperature and limiting nutrient concentration on competition between algal species. A—$\hat{\mu}_B > \hat{\mu}_A$. B—$\hat{\mu}_B = \hat{\mu}_A$. C—$\hat{\mu}_B < \hat{\mu}_A$. (For the effects of temperature on $\hat{\mu}_A$ and $\hat{\mu}_B$ *see Fig. 3A.)*

tude of each coefficient contributes to algal growth.

An illustration of this point is the case in which two algal species have different K_s values for a particular limiting nutrient and, as in Fig. 3A, also have different Q_{10} values. For simplicity, it is assumed that K_s is not affected by temperature. In Fig. 4 we examine three different growth situations depicted by the temperature regions (T_1, T_2, T_3) shown in Fig. 3A. In the temperature region T_1, $\hat{\mu}$ for alga B is greater than for alga A: thus K_s strongly influences the growth rates of both species at low nutrient levels, and alga A, because of its lower K_s value and higher growth rate, would dominate (Fig. 4A). As the limiting nutrient concentration increases, temperature exerts an increasing effect on the growth rate and alga B would become the more successful competitor. When the temperature increases, $\hat{\mu}$ increases more rapidly for alga A than for alga B and the influence of temperature becomes more important over the entire range of nutrient concentration. At the intersection (T_2) of the two temperature curves in Fig. 3A both species have equal $\hat{\mu}$ values: temperature is virtually eliminated as an influencing factor and alga B would be able to compete with alga A only at very high nutrient levels that correspond to $\hat{\mu}$ (Fig. 4B). At even higher temperatures (T_3) the combined effect of K_s and temperature would allow alga A to dominate over alga B at all nutrient concentrations (Fig. 4C).

Although we recognize the gross oversimplifications in the preceding examples—no consideration was given to the effect of temperature on other parameters as K_s, Y, k_d, predation, and sinking—they do serve to demonstrate the power of multiplicative models to describe the interactions between environmental factors both quantitatively and qualitatively. With the aid of the computer it may be possible to compare the relative effects of a multitude of numerical values for the different temperature dependent growth parameters on the net specific growth rate and to elucidate the relative importance of temperature and limiting nutrient concentration on the growth of phytoplankton in both natural and controlled situations.

As Middlebrooks and Porcella (1971) and Eppley (1972) have suggested, use of multivariate kinetics is a highly promising technique for modeling aquatic systems. This technique should find widespread applicability in laboratory studies, particularly with continuous cultures, for finding kinetic coefficients controlling the interactions between environmental factors and their resultant effect on growth rates. By developing a catalog of these coefficients for many algae and environmental conditions we should be able to make predictions concerning the conditions necessary

for certain species to win out in competition with others; simple competition experiments could then test the validity of the models.

There is a note of caution, however. A tendency exists among researchers to overgeneralize and indiscriminately apply models such as our equation 7 to describe a broad range of aquatic systems. *Models*, as we all are aware, tend to take on omnipotent qualities with time, particularly if they are not challenged or modified as new data become available. We have tried to avoid this by suggesting that the coefficients of our model may be valid only for small single-celled diatoms and green algae since these were the only species for which we could find temperature-growth rate data in the literature. We have tried to reinforce this idea by presenting some hypothetical competition relationships, backed by considerable data from the literature, showing that simple models such as ours do not always tell the whole story. Obviously, the applicability and restrictions of our model await further experimentation.

References

BRAARUD, T. 1961. Cultivation of marine organisms as a means of understanding environmental influences on populations, p. 271–298. *In* M. Sears [ed.], Oceanography. AAAS.

BROCK, T. D. 1967. Micro-organisms adapted to high temperatures. Nature (Lond.) **214**: 882–885.

CAIRNS, J., JR. 1956. Effects of increased temperatures on aquatic organisms. Ind. Wastes **1**: 150–152.

CAPERON, J., AND J. MEYER. 1972. Nitrogen-limited growth of marine phytoplankton. 1. Changes in population characteristics with steady state growth rate. Deep-Sea Res. **19**: 601–618.

CARPENTER, E. J. 1973. Brackish-water phytoplankton response to temperature elevation. Estuarine Coastal Mar. Sci. **1**: 37–44.

CASTENHOLZ, R. W. 1969. Thermophilic blue-green algae and the thermal environment. Bacteriol. Rev. **33**: 476–504.

DAVIES, A. G. 1970. Iron, chelation and the growth of marine phytoplankton. 1. Growth kinetics and chlorophyll production in cultures of the euryhaline flagellate *Dunaliella tertiolecta* under iron-limiting conditions. J. Mar. Biol. Assoc. U.K. **50**: 65–86.

DITORO, D. M., D. J. O'CONNER, AND R. V. THOMANN. 1971. A dynamic model of the phytoplankton population in the Sacramento-San Joaquin Delta, p. 131–180. *In* J. D. Hem [ed.], Nonequilibrium systems in natural waters. Adv. Chem. Ser. 106.

DROOP, M. R. 1968. Vitamin B_{12} and marine ecology. 4. The kinetics of uptake, growth and inhibition in *Monochrysis lutheri*. J. Mar. Biol. Assoc. U.K. **48**: 689–733.

———. 1970. Vitamin B_{12} and marine ecology. 5. Continuous culture as an approach to nutritional kinetics. Helgol. Wiss. Meeresunters. **20**: 629–636.

DROST-HANSEN, W. 1969. Allowable thermal pollution limits—a physicochemical approach. Chesapeake Sci. **10**: 281–288.

DUGDALE, R. C. 1967. Nutrient limitation in the sea: dynamics, identification, and significance. Limnol. Oceanogr. **12**: 685–695.

EPPLEY, R. W. 1972. Temperature and phytoplankton growth in the sea. Fish. Bull. **70**: 1063–1085.

———, J. N. ROGERS, AND J. J. MCCARTHY. 1969. Half-saturation constants for uptake of nitrate and ammonium by marine phytoplankton. Limnol. Oceanogr. **14**: 912–920.

———, AND P. R. SLOAN. 1966. Growth rates of marine phytoplankton: correlation with light absorption by cell chlorophyll *a*. Physiol. Plant. **19**: 47–59.

———, AND J. D. H. STRICKLAND. 1968. Kinetics of marine phytoplankton growth, p. 23–62. *In* M. R. Droop and E. J. Ferguson Wood [eds.], Adv. Microbiol., v. 1. Academic.

FUHS, G. W. 1969. Phosphorus content and rate of growth in the diatoms *Cyclotella nana* and *Thalassiosira fluviatilis*. J. Phycol. **5**: 312–321.

GOLDMAN, J. C., W. J. OSWALD, AND D. JENKINS. 1974. The kinetics of inorganic carbon-limited algal growth. J. Water Pollut. Control Fed. **46**: 554–574.

GUILLARD, R. R. L., E. J. CARPENTER, AND B. E. F. REIMANN. 1974. *Skeletonema menzeli* sp. nov., a new diatom from the western Atlantic Ocean. Phycologia (in press).

———, AND J. H. RYTHER. 1962. Studies of marine planktonic diatoms. 1. *Cyclotella nana* Hustedt, and *Detonula confervacea* (Cleve) Gran. Can. J. Microbiol. **8**: 229–239.

HOCKLEY, A. R. 1963. Some effects of warm water effluents in Southampton water. Annu. Rep. Challenger Soc. **3**: 37–38.

HOOGENHOUT, H., AND J. AMESZ. 1965. Growth rates of photosynthetic microorganisms in laboratory cultures. Archiv Microbiol. **50**: 10–24.

HULBURT, E. M., AND R. R. L. GUILLARD. 1968. The relationship of the distribution of the diatom *Skeletonema tropicum* to temperature. Ecology **49**: 337–339.

MACISAAC, J. J., AND R. C. DUGDALE. 1972. Interactions of light and inorganic nitrogen in controlling nitrogen uptake in the sea. Deep-Sea Res. **19**: 209–232.

MERRIMAN, D. 1970. The calefaction of a river. Sci. Am. **222**: 42–81.

MIDDLEBROOKS, E. J., AND D. B. PORCELLA. 1971. Rational multivariate algal growth kinetics. J. Sanit. Eng. Div. Proc. Am. Soc. Civ. Eng. **97SAI**: 135–140.

MORGAN, R. P., AND R. G. STROSS. 1969. Destruction of phytoplankton in the cooling water supply of a steam electric station. Chesapeake Sci. **10**: 165–171.

PAASCHE, E. 1973. Silicon and the ecology of marine plankton diatoms. 1. *Thalassiosira pseudonana* (*Cyclotella nana*) grown in a chemostat with silicate as limiting nutrient. Mar. Biol. **19**: 117–126.

PANNEL, J. P. M., A. E. JOHNSON, AND J. E. G. RAYMONT. 1962. An investigation into the effects of warmed water from Marchwood Power Station into Southampton water. Proc. Inst. Civ. Eng. **23**: 35–62.

PATRICK, R. 1969. Some effects of temperature on freshwater algae, p. 161–185. *In* P. A. Krenkel and F. L. Parker [eds.], Biological aspects of thermal pollution. Vanderbilt.

RYTHER, J. H. 1969. Photosynthesis and fish production in the sea. Science **166**: 72–76.

———, AND R. R. L. GUILLARD. 1962. Studies of marine planktonic diatoms. 3. Some effects of temperature on respiration of five species. Can. J. Microbiol. **8**: 447–453.

SHELEF, G. 1968. Kinetics of algal systems in waste treatment. Light intensity and nitrogen concentration as growth-limiting factors. Ph.D. thesis, Univ. Calif., Berkeley.

———, W. J. OSWALD, AND C. C. GOLUEKE. 1970. Assaying algal growth with respect to nitrate concentration by a continuous flow turbidostat, p. 3-25/1–9. *In* S. H. Jenkins [ed.], Proc. Int. Conf. Water Pollut. Res., 5th. Pergamon.

SMAYDA, T. J. 1969. Experimental observations of the influence of temperature, light and salinity on cell division of the marine diatom *Detonula confervacea* (Cleve) Gran. J. Phycol. **5**: 150–157.

SOEDER, C. J., H. MULLER, H. D. PAYER, AND H. SCHULLE. 1971. Mineral nutrition of planktonic algae: some considerations with experiments. Mitt. Int. Ver. Theor. Angew. Limnol. 19, p. 39–58.

SOROKIN, C. 1960. Kinetic studies of temperature effects on the cellular level. Biochim. Biophys. Acta **38**: 197–204.

———. 1971. Calefaction and phytoplankton. BioScience **21**: 1153–1159.

SWIFT, D. G. 1967. Growth of vitamin B_{12} limited cultures: *Cyclotella nana*, *Monochrysis lutheri*, and *Isochrysis galbana*. M.S. thesis, Johns Hopkins Univ., Baltimore.

THOMAS, W. H. 1966. Surface nitrogenous nutrients and phytoplankton in the northeastern tropical Pacific Ocean. Limnol. Oceanogr. **11**: 393–400.

TOERIEN, D. F., C. H. HUANG, J. RADIMSKY, E. A. PEARSON, AND J. SCHERFIG. 1971. Final report: Provisional algal assay procedures. Sanit. Eng. Res. Lab., SERL Rep. 71-6. Univ. Calif., Berkeley.

TOPIWALA, H., AND C. G. SINCLAIR. 1971. Temperature relationship in continuous culture. Biotechnol. Bioeng. **13**: 795–813.

WILLIAMS, F. M. 1965. Population growth and regulation in continuously cultured algae. Ph.D. thesis, Yale Univ.

ZABAT, M. 1970. Kinetics of phosphorus removal by algae. Ph.D. thesis, Univ. Calif., Berkeley.

Submitted: 14 November 1973
Accepted: 6 June 1974

EXHIBIT C

Sanpete County Water Conservancy District
Financial Statements
(December 31, 2005)

SANPETE COUNTY WATER CONSERVANCY DISTRICT

FINANCIAL STATEMENTS

DECEMBER 31, 2005

CONTENTS

Kimball & Roberts
Certified Public Accountants
A Professional Corporation
Box 663
Richfield, Utah 84701
Phone 896-6488

ACCOUNTANT'S REPORT

The Honorable Board Members
Sanpete County Water Conservancy District
Manti, Utah 84642

We have reviewed the accompanying financial statements of the governmental activities of Sanpete County Water Conservancy District as of and for the year ended December 31, 2005, which comprise the Districts basic financial statements as listed in the table of contents, in accordance with Statements on Standards for Accounting and Review Services issued by the American Institute of Certified Public Accountants. All information included in these financial statements is the representation of the management of Sanpete County Water Conservancy District.

A review consists principally of inquiries of District personnel and analytical procedures applied to financial data. It is substantially less in scope than an audit in accordance with generally accepted auditing standards, the objective of which is the expression of an opinion regarding the financial statements taken as a whole. Accordingly, we do not express such an opinion.

Based on our review, we are not aware of any material modifications that should be made to the accompanying financial statements in order for them to be in conformity with generally accepted accounting principles.

The management's discussion and analysis and budgetary comparison information on pages 4 through 7 and 23, are not a required part of the basic financial statements but are supplementary information required by the Governmental Accounting Standards Board. Such information has not been subjected to the inquiry and analytical procedures applied in the review of the basic financial statements, but was compiled from information that is the representation of management, without audit or review. Accordingly, we do not express an opinion or any other form of assurance on the supplementary information.

KIMBALL & ROBERTS, P. C.
Certified Public Accountants

July 3, 2006
Richfield, Utah

Sanpete County Water Conservancy District
Management's Discussion and Analysis

This discussion and analysis of Sanpete County Water Conservancy District (District) financial performance provides an overview of the District's financial activities for the year ending December 31, 2005. This report is in conjunction with the District's financial statements, which are part of this report.

The purpose of Sanpete County Water Conservancy District is to develop water for Sanpete County.

Financial Highlights:

- The District has one depreciable asset, a water metering system. It has expended $82,731 on the narrows dam project in 2005. This is in addition to previous years expenditures on this project of $2,735,176.
- At the close of the current year, the District reported ending Net Assets of $3,663,043 of which $611,834 was restricted for capital projects.
- The District does not have any full-time employees and spent 58% on on operating expenditures leaving 42% of the funds for capital additions on the narrows project in upper Gooseberry, east of Fairview, Utah.
- The District generates revenues through property tax assessments in Sanpete County. This year the District received $267,327 in property taxes and $50,879 in Fee-In-Lieu of taxes. It also earned $13,087 in unrestricted investment earnings (Interest) on its idle funds.

Using This Annual Report
This discussion and analysis is intended to serve as an introduction to Sanpete County Water Conservancy District financial statements. The basic financial statements comprise three components:
1) government-wide financial statements, 2) fund financial statements, and 3) notes to the financial statements. This report also contains other supplementary information in addition to the basic financial statements themselves.

Government-wide financial statements
The government-wide financial statements are designed to provide readers with a broad overview of the District's finances, in a manner similar to a private-sector business.

The statement of net assets presents information on all of the District's assets and liabilities, with a difference between the two reported as net assets. Over time, increases and decreases in net assets may serve as a useful indicator of whether the financial position of the District is improving or deteriorating.

The statement of activities present information showing how the government's net assets changed during the most recent fiscal year. All changes in net assets are reported as soon as the underlying event giving rise to the change occurs, regardless of the timing of related cash flows. Thus, revenues and expenses are reported in this statement for some items that will only result in cash flows in future periods.

Governmental Funds:
Governmental funds are used to account for essentially the same functions reported as governmental activities in the government-wide financial statements. However, unlike the government-wide financial statements, governmental fund financial statements focus on near-term inflows and outflows of spendable resources, as well as on balance of spendable resources available at the end of the year.

The district has two governmental funds, the general fund and a capital projects fund. The general fund at year end has unreserved fund balance of $252,696. The Capital project fund has a fund balance of $611,834, which is restricted for planned capital projects. The unreserved fund balance in the general fund is available for expenditures in future. years budgets. Unreserved fund balance is 132% of total expenditures in the general fund.

Reporting the District as a Whole
The District realizes revenues from several sources; 1)property tax revenue 2)fee-in-lieu taxes and 3) unrestricted investment earnings.

Condensed Financial Statements:

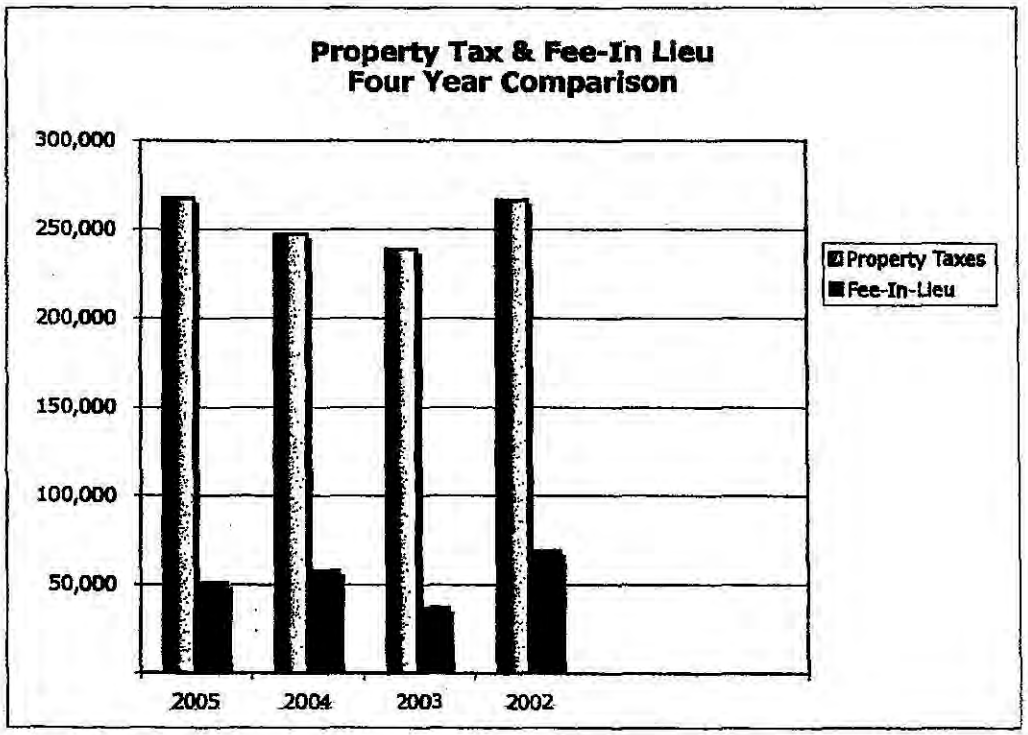
A comparative analysis is provided for 2005 and 2004.

	2005	2004		2005	2004
Assets:			Revenues:		
			Property Taxes	267,327	247,532
Current	875,970	724,350	Other Taxes	52,301	57,897
Non-Current	2,848,079	2,767,123	Investment Earnings	13,087	10,758
Total Assets	3,724,049	3,491,473	Total Revenues	332,715	316,187
Liabilities:			Expenditures:		
Current	11,440	-	Current	111,579	130,018
Long-Term	49,566	49,566	Capital	82,731	43,985
Total Liabilities	61,006	49,566	Total Expenditures	194,310	174,003
Net Assets:					
Invested in Capital Assets	2,798,513	2,717,557			
Restricted	611,834	560,208	Change in Net Assets	221,136	186,170
Unrestricted	252,696	164,142	Beginning Net Assets	3,441,907	3,255,737
Net Assets	3,663,043	3,441,907	Ending Net Assets	3,663,043	3,441,907

Contacting the District
This financial report is designed to provide the citizens with a general overview of the District's finances and to show accountability for the money it receives. If you have questions about his report or need additional financial information, contact Secretary, David R. Cox, 90 West Union, Manti, UT 84642.

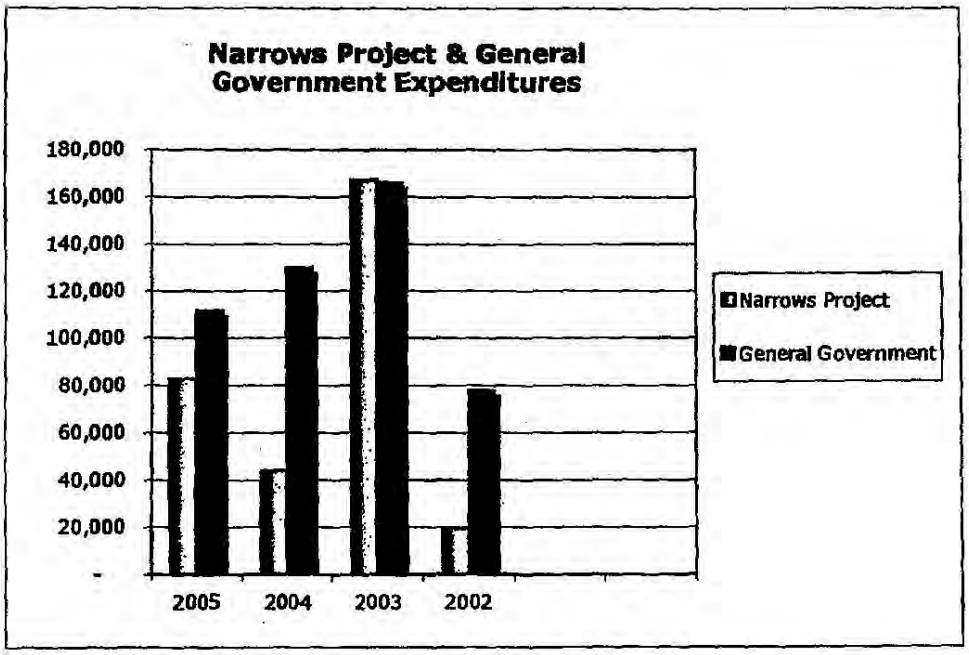
Sanpete County Water Conservancy District
Revenue - Four Year Comparison

	2005	2004	2003	2002
Property Taxes	267,327	247,532	238,950	266,631
Fee-In-Lieu	50,879	57,897	36,818	69,327
Sundry	1,422	-	9,548	3,735
Investment Earnings	13,087	10,758	6,524	11,217
Total	332,715	316,187	291,840	350,910



Sanpete County Water Conservancy District
Expenditures - Four Year Comparison

	2005	2004	2003	2002
Narrows Project	82,731	43,985	167,234	19,636
General Government	111,579	130,018	166,037	77,796
Total	194,310	174,003	333,271	97,432



(This page contains no information and
is used to assist in formatting, for easier reading)

BASIC FINANCIAL STATEMENTS

SANPETE COUNTY WATER CONSERVANCY DISTRICT
STATEMENT OF NET ASSETS

December 31, 2005

	Governmental Activities
ASSETS	
Current Assets:	
Cash and Investments	817,534
Taxes Receivable	58,436
Total Current Assets	875,970
Noncurrent Assets:	
Capital Assets (Net of Accumulated Depreciation):	
Water Metering System	30,172
Construction-In-Progress	2,817,907
Total Noncurrent Assets	2,848,079
TOTAL ASSETS	3,724,049
LIABILITIES	
Current Liabilities:	
Accounts Payable	11,440
Noncurrent Liabilities:	
Note Payable - Due More Than One Year	49,566
TOTAL LIABILITIES	61,006
NET ASSETS	
Invested In Capital Assets, Net of Related Debt	2,798,513
Restricted for Capital Projects	611,834
Unrestricted	252,696
TOTAL NET ASSETS	3,663,043
TOTAL LIABILITIES AND NET ASSETS	3,724,049

See accompanying notes and accountant's report.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
STATEMENT OF ACTIVITIES

For The Year Ended December 31, 2005

		Program Revenues		Net (Expense) Revenue and Changes in Net Assets
	Expenses	Charges for Services	Operating Grants/ Contributions	Governmental Activities
Functions/Programs:				
Governmental Activities:				
Water Conservancy Operations	111,579	-	-	(111,579)
TOTAL REVENUES	111,579	-	-	(111,579)
General Revenues:				
Property Taxes				267,327
Other Taxes				50,879
Other Income				1,422
Unrestricted Investment Earnings				13,087
Total General Revenues				332,715
Changes in Net Assets				221,136
Net Assets - Beginning				3,441,907
Net Assets - Ending				3,663,043

See accompanying notes and accountant's report.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
BALANCE SHEET
GOVERNMENTAL FUNDS

December 31, 2005

	General Fund	Capital Projects Fund	Total Governmental Funds
ASSETS			
Cash and Investments:			
Restricted		611,834	611,834
Unrestricted	205,700	-	205,700
Taxes Receivable	58,436	-	58,436
TOTAL ASSETS	264,136	611,834	875,970
LIABILITIES AND FUND EQUITY			
Liabilities:			
Accounts Payable	11,440	-	11,440
Fund Equity:			
Fund Balance:			
Restricted For Capital Projects	-	611,834	611,834
Undesignated	252,696	-	252,696
Total Fund Equity	252,696	611,834	864,530
TOTAL LIABILITIES AND FUND EQUITY	264,136	611,834	875,970

See accompanying notes and accountant's report.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
BALANCE SHEET RECONCILIATION TO STATEMENT OF NET ASSETS

December 31, 2005

Total Fund Balances - Governmental Fund Types		864,530
Amounts reported for governmental activities in the statement of net assets are different because:		
Capital assets used in governmental activities are not financial resources and, therefore, are not reported in the funds:		
Water Metering System	30,172	
Construction-In-Progress	2,817,907	
Total (Net of Depreciation)		2,848,079
Long-term liabilities, including bonds payable, are not due and payable in the current period and, therefore, are not reported in the funds:		
Revenue Bonds Payable		(49,566)
Net Assets of Government Activities		3,663,043

SANPETE COUNTY WATER CONSERVANCY DISTRICT
STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCE
GOVERNMENTAL FUNDS

For The Year Ended December 31, 2005

	General Fund	Capital Projects Fund	Total Governmental Funds
Revenues:			
Property Taxes	238,508	-	238,508
Delinquent Property Taxes	28,818	-	28,818
Fee-In-Lieu	50,879	-	50,879
Other Income	1,422	-	1,422
Interest	13,087	-	13,087
Total Revenues	332,714	-	332,714
Expenditures:			
Current Expenditures:			
Engineering Fees	14,911	-	14,911
Engineering Fees - Narrows	59,997	-	59,997
Attorney Fees - Narrows	22,734	-	22,734
Attorney Fees	22	-	22
Cloud Seeding	14,570	-	14,570
Board of Directors Expense	2,750	-	2,750
Secretary Expenses	500	-	500
Insurance and Bonds	464	-	464
Supplies	109	-	109
Payroll taxes	249	-	249
Subscriptions	250	-	250
Advertising	390	-	390
Administrative Expenses	2,023	-	2,023
Public Relations	69,882	-	69,882
Mosquito Abatement	3,500	-	3,500
Other	183	-	183
Total Expenditures	192,534	-	192,534
Excess of Revenues Over (Under) Expenditures	140,180	-	140,180
Other Financing Sources (Uses):			
Transfers In (Out)	(51,626)	51,626	-
Net Change in Fund Balance	88,554	51,626	140,180
Fund Balance - Beginning	164,142	560,208	724,350
Fund Balance - Ending	252,696	611,834	864,530

See accompanying notes and accountant's report.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
RECONCILIATION OF THE STATEMENT OF REVENUES, EXPENDITURES AND CHANGES IN FUND BALANCES OF GOVERNMENTAL FUNDS TO THE STATEMENT OF ACTIVITIES

For The Year Ended December 31, 2005

Amounts reported for governmental activities in the statement of activities are different because:		
Net Changes in Fund Balances - Total Governmental Funds		140,180
Governmental funds report capital outlays as expenditures. However, in the statement of activities the cost of those assets is allocated over their estimated useful lives and reported as depreciation expense. This is the amount by which capital outlays exceeded depreciation in the current period:		
Capital Outlay	82,731	
Depreciation	(1,775)	
Total		80,956
Changes In Net Assets of Governmental Activities		221,136

SANPETE COUNTY WATER CONSERVANCY DISTRICT
NOTES TO FINANCIAL STATEMENTS

December 31, 2005

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

The Sanpete County Water Conservancy District was organized in 1961 for the purpose of developing water for the County.

A. Reporting Entity

For financial reporting purposes, Sanpete County Water Conservancy District has included all funds. The District has also considered all potential component units for which it is financial accountable and that exclusion would cause the District's financial statements to be misleading or incomplete. The Governmental Accounting Standards Board has set forth criteria to be considered in determining financial accountability. These criteria include appointing a voting majority of an organization's governing body and (1) the ability of the District to impose its will on that organization or (2) the potential for the organization to provide specific financial benefits to, or impose specific financial burdens on the District.

As required by generally accepted accounting principles, these financial statements present Sanpete County Water Conservancy District, the reporting entity.

B. Government-Wide and Fund Financial Statements

The Statement of Net Assets and the Statement of Activities display information about the District, the primary government, as a whole. Governmental activities, which normally are supported by taxes and intergovernmental revenues, are reported separately from business-type activities, which rely to a significant extent on fees and charges for support.

The statement of activities demonstrates the degree to which the direct expenses of a given function or segment are offset by program revenues. Direct expenses are those that are clearly identifiable with a specific function or segment. Program revenues include 1) charges to customers or applicants who purchase, use or directly benefit from goods, services or privileges provided by a given function or segment and 2) grants and contributions that are restricted to meeting the operational or capital requirements of a particular function or segment. Taxes and other items not properly included among program revenues are reported instead as general revenues.

Separate financial statements are provided for governmental funds and fiduciary funds, even through the latter are excluded from the government-wide financial statements. Major individual governmental funds are reported as separate columns in the fund financial statements.

C. Measurement Focus, Basis of Accounting and Financial Statement Presentation

The government-wide financial statements are reported using the economic resources measurement focus and accrual. Revenues are recorded when earned and expenses are recorded when a liability is incurred, regardless of the timing of related cash flows. Grants and similar items are recognized as revenue as soon as all eligibility requirements imposed by the provider have been met.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
NOTES TO FINANCIAL STATEMENTS (CONTINUED)

December 31, 2005

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Governmental fund financial statements are reported using the current financial resources measurement focus and the modified accrual basis of accounting. Revenues are recognized as soon as they are both measurable and available. Revenues are considered to be available when they are collectible within the current period or soon enough thereafter to pay liabilities of the current period. For this purpose, the government considers revenues to be available if they are collected within 60 days of the end of the current fiscal period. Expenditures generally are recorded when a liability is incurred, as under accrual accounting. However, debt service expenditures, as well as expenditures related to compensated absences and claims and judgments, are recorded only when payment is due.

State revenue sources and interest associated with the current fiscal period are considered to be susceptible to accrual and so have been recognized as revenues of the current fiscal period. All other revenues items are considered to be measurable and available only when cash is received by the government.

The government reports the following major governmental funds:

The General Fund is the government's primary operating fund. It accounts for all financial resources of the general government.

The Capital Projects Fund accounts for the acquisition of fixed assets or construction of major capital projects.

D. Assets, Liabilities and Net Assets or Equity

Deposits and Investments:

The government's cash and cash equivalents are considered to be cash on hand, demand deposits and short-term investments with original maturities of three months or less from the date of acquisition.

State statutes authorize the government to invest in obligations of the U. S. Treasury, commercial paper, corporate bonds, repurchase agreements and the State Treasurer's Investment Pool.

Investments for the government are reported at fair value. The State Treasurer's Investment Pool operates in accordance with appropriate state laws and regulations. The reported value of the pool is the same as the fair value of the pool shares.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
NOTES TO FINANCIAL STATEMENTS (CONTINUED)

December 31, 2005

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

Capital Assets:

Capital assets, which include property, plant, equipment, and infrastructure assets (e.g., roads, bridges, sidewalks and similar items), are reported in the applicable governmental activities column in the government-wide financial statements. Capital assets are defined by the government as assets with an initial, individual cost of more than $5,000 and an estimated useful life in excess of two years. Such assets are recorded at historical cost or estimated historical cost if purchased or constructed. Donated capital assets are recorded at estimated fair market value at date of donation.

The cost of normal maintenance and repairs that do not add to the value of the asset or materially extend assets lives are not capitalized.

Major outlays for capital assets and improvements are capitalized as projects are constructed.

Property, plant and equipment of the primary government is depreciated using the straight line method over the following estimated useful lives:

Water Metering System	25 Years

Long-Term Obligations:

In the government-wide financial statements long-term debt and other long-term obligations are reported as liabilities in the applicable governmental activities statement of net assets.

In the fund financial statement, governmental fund types recognize bond premiums and discounts, as well as bond issuance costs, if any, during the current period. The face amount of debt issued is reported as other financing sources. Premiums received on debt issuances are reported as other financing sources while discounts on debt issuance are reported as other financing uses. Issuance costs, whether or not withheld from the actual debt proceeds received, are reported as debt service expenditures.

Fund Equity:

In the fund financial statements, governmental funds report reservations of fund balance for amounts that are not available for appropriation or are legally restricted by outside parties for use for a specific purpose. Designation of fund balance represent tentative management plans that are subject to change.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
NOTES TO FINANCIAL STATEMENTS (CONTINUED)

December 31, 2005

NOTE 1 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES (CONTINUED)

E. Use of Estimates:

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

F. Property Taxes

Property taxes are assessed and collected for the District by Sanpete County and remitted to the District shortly after collection. Property taxes become a lien on January 1 and are levied on the first Monday in August. Taxes are due and payable on November 1, and are delinquent after November 30. All dates are in the year of levy.

NOTE 2 - BUDGETARY COMPLIANCE

Excess of Expenditures over Appropriations - The Fiscal Procedures Act requires expenditures be restricted to authorized budgets. The statement of revenues, expenditures and changes in fund balance, budget and actual, identifies the accounts which have overexpended budgeted amounts if any and, therefore, do not comply with appropriate fiscal procedures.

NOTE 3 - DEPOSITS AND INVESTMENTS

Deposits:

At year-end the carrying amount of the Districts deposits was $817,534 and the bank balances were $871,900. Of this amount $200,000 was covered by federal depository insurance. Utah State statutes do not require deposits to be collateralized, however, financial institutions must be approved by the State Money Management Council.

Cash and investments as of December 31, 2005, consist of the following:

	Fair Value
Demand Deposits	817,534

Cash and investments listed above are classified in the accompanying government-wide statement of net assets as follows:

Governmental Activities - Unrestricted	205,700
Governmental Activities - Restricted	611,834
Total Cash and Cash Equivalents	817,534

SANPETE COUNTY WATER CONSERVANCY DISTRICT
NOTES TO FINANCIAL STATEMENTS (CONTINUED)

December 31, 2005

NOTE 3 - DEPOSITS AND INVESTMENTS (CONTINUED)

The Utah Money Management Act (UMMA) established specific requirements regarding deposits of public funds by public treasurers. UMMA requires that District funds be deposited with a qualified depository which includes any depository institution which has been certified by the Utah State Commissioner of Financial Institutions as having met the requirements specified in UMMA Section 51, Chapter 7. UMMA provides the formula for determining the amount of public funds which a qualified depository may hold in order to minimize risk of loss and also defines capital requirements which an institution must maintain to be eligible to accept public funds. UMMA lists the criteria for investments and specifies the assets which are eligible to be invested in, and for some investments, the amount of time to maturity.

UMMA enables the State Treasurer to operate the Public Treasurer's Investment Pool (PTIF). PTIF is managed by the Utah State Treasurer's investment staff and comes under the regulatory authority of the Utah Money Management Council. This council is comprised of a select group of financial professionals from units of local and state government and financial institutions doing business in the state. PTIF operations and portfolio composition is monitored at least semi-annually by Utah Money Management Council. PTIF is unrated by any nationally recognized statistical rating organizations. Deposits in PTIF are not insured or otherwise guaranteed by the State of Utah. Participants share proportionally in any realized gains or losses on investments which are recorded an amortized cost basis. The balance available for withdrawal is based on the accounting records maintained by PTIF. The fair value of the investment pool is approximately equal to the value of the pool shares.

Custodial Credit Risk:

Deposits - Custodial credit risk for deposits is the risk that in the event of a bank failure, the local government's deposits may not be recovered. The local government's policy for managing custodial credit risk is to adhere to the Money Management Act. The Act requires all deposits of the local government to be in a qualified depository, defined as any financial institution whose deposits are insured by an agency of the federal government and which has been certified by the Commissioner of Financial Institutions as meeting the requirements of the Act and adhering to the rules of the Utah Money Management Council. As of December 31, 2005, $671,900 of the local government's bank balances of $871,900 were uninsured and uncollateralized.

Credit Risk:

Credit risk is the risk that the counterparty of an investment will not fulfill its obligations. The local government's policy for limiting the credit risk of investments is to comply with the Money Management Act.

The local government is authorized to invest in the Utah Public Treasurer's Investment Fund (PTIF), an external pooled investment fund managed by the Utah State Treasurer and subject to the Act and Council requirements. The PTIF is not registered with the SEC as an investment company, and deposits in the PTIF are not insured or otherwise guaranteed by the State of Utah. The PTIF operates and reports to participants on an amortized cost basis. The income, gains and losses, net of administration fees, of the PTIF are allocated based upon the participants' average daily balances. The PTIF pool has not been rated.

SANPETE COUNTY WATER CONSERVANCY DISTRICT
NOTES TO FINANCIAL STATEMENTS (CONTINUED)

December 31, 2005

NOTE 3 - DEPOSITS AND INVESTMENTS (CONTINUED)
Concentration of Credit Risk:

Concentration of credit risk the risk of loss attributed to the magnitude of a government's investments in a single issuer. The District deposits in two institutions, Far West Bank and Moroni Feed Credit Union.

NOTE 4 - TAXES RECEIVABLES
Taxes receivable are funds held by Sanpete County due to Sanpete County Water Conservancy District at December 31, 2005.

NOTE 5 - CONSTRUCTION IN PROGRESS
Narrows:

Construction in Progress - Narrows represents legal, engineering, and construction costs associated with the anticipated building of a dam in Upper Gooseberry, east of Fairview, Utah.

NOTE 6 - CAPITAL ASSETS
Capital Assets activity for the year ended December 31, 2005, was as follows:

	Beginning Balance	Additions	Deletions	Ending Balance
Governmental Activities:				
Capital Assets Not Being Depreciated:				
Construction-In-Progress	2,735,176	82,731	-	2,817,907
Capital Assets Being Depreciated:				
Water Metering System	44,372	-	-	44,372
Less Accumulated Depreciation For:				
Water Metering System	12,425	1,775	-	14,200
Total Capital Assets Being Depr. (Net)	31,947	(1,775)	-	30,172
Governmental Activities Capital Assets (Net)	2,767,123	80,956	-	2,848,079

SANPETE COUNTY WATER CONSERVANCY DISTRICT
NOTES TO FINANCIAL STATEMENTS (CONTINUED)

December 31, 2005

NOTE 6 - CAPITAL ASSETS (CONTINUED)

Depreciation was charged to functions of the Government as follows:

General Fund	1,775.00

NOTE 7 - NOTE PAYABLE DIVISION OF WATER RESOURCES

On May 1, 1994, the State of Utah, Department of Natural Resources, Division of Water Resources, approved funding to provide financial assistance for completion of the final Environmental Impact Statement for the Narrows Project in Carbon and Sanpete Counties.

The State approved a $75,000 loan to be repaid when the Narrows Dam is constructed. At this time there are no terms set for repayment, nor has an interest rate been set. On November 21, 1994, the District received an advance from the State in the amount of $52,465, leaving an undisbursed approved amount of $22,535. Additional funds of $22,101 were advanced during 1995. The total amount of advanced funds at December 31, 1995 was $74,566. During 1996 the District repaid $25,000 leaving a balance due of $49,566. These funds are advanced upon submission of approved expenditures for the Environmental Impact Statement. The advanced funds of $49,566 are shown as a note payable at December 31, 2005.

The following is statement of changes in the note payable:

	Balance December 31, 2004	Additions	Deletions	Balance December 31, 2005
Note Payable - Division of Water Resources	49,566	-	-	49,566

REQUIRED SUPPLEMENTARY INFORMATION "UNAUDITED"

(This page contains no information and
is used to assist in formatting, for easier reading)

SANPETE COUNTY WATER CONSERVANCY DISTRICT
BUDGETARY COMPARISON SCHEDULE
GENERAL FUND

For The Year Ended December 31, 2005

	Budgeted Amounts		Actual Amounts	Variance with Final Budget Positive (Negative)
	Original	Final		
Revenues:				
Property Taxes	170,569	170,569	238,508	67,939
Fee-In-Lieu	38,360	38,360	50,879	12,519
Delinquent Property Taxes	21,961	21,961	28,818	6,857
Other Income	-	-	1,422	1,422
Interest	13,087	13,087	13,087	-
Total Revenues	243,977	243,977	332,714	88,737
Expenditures:				
Current:				
Attorney Fees	22,756	22,756	22,756	-
Engineering Fees	74,908	74,908	74,908	-
Board of Directors Expenses	2,750	2,750	2,750	-
Secretary Expenses	500	500	500	-
Insurance and Bonds	464	464	464	-
Supplies	109	109	109	-
Cloud Seeding	14,570	14,570	14,570	-
Construction and Labor	51,625	51,625	-	51,625
Payroll Taxes	249	249	249	-
Subscriptions	250	250	250	-
Advertising	391	391	391	-
Public Relations	69,882	69,882	69,882	-
Administrative Expenses	2,023	2,023	2,023	-
Mosquito Abatement	3,500	3,500	3,500	-
Other	-	-	183	(183)
Total Expenditures	243,977	243,977	192,535	51,442
Excess Revenues Over (Under) Expenditures	-	-	140,179	140,179
Other Financing Sources (Uses)				
Transfers In (Out)			(51,625)	
Net Changes In Fund Balance			88,554	
Fund Balance - Beginning of Year			164,142	
Fund Balance - End of Year			252,696	

66. TROUT UNLIMITED STONEFLY SOCIETY, FREDERICK W. REIMHERR

ORIGINAL

Crookston, Peter L

From: Fred Reimherr [fred.reimherr@hsc.utah.edu]
Sent: Tuesday, June 01, 2010 9:11 AM
To: PRO NarrowsEIS
Subject: Comments on Narrows
Attachments: narrows comments June 2010.pdf

Mr. Crookston,

I would like to submit these comments in behalf of the Stonefly Society Chapter of Trout Unlimited.

Fred Reimherr

PRO OFFICIAL FILE COPY
RECEIVED
JUN 10 '10

Reply Date		
Date	Initials	Code
		100
		105
		107
		700
		770
6/23/10	PC	774 cy

Action:
Classification: ENV-6.00
Project: NARROWS
Control No: 10041492
ID: 1122816

1

Stonefly Society Chapter Trout Unlimited
c/o Frederick Reimherr
482 12th Avenue
Salt Lake City, Utah
84103-3225
June 1, 2010

Bureau of Reclamation
Attention: Peter Crookston, PRO-774
302 East 1860 South
Provo, Utah 84606-7317
Facsimile: 801 379-1152
narrowsSDEIS@usbr.gov

Dear Mr. Crookston;

The Stonefly Society Chapter Trout Unlimited has had a long history of opposition to this senseless, and highly destructive water project. We are Trout Unlimited's largest Utah Chapter and represent over a thousand Utah fishermen.

We have commented repeatedly on the Narrows Project. We financed the original study that documented the presence of the endangered pikeminnow in the lower Price River. We have worked with the Central Utah Water Conservancy District attempting produce an alternative for Sanpete County, a process that has been unfortunately side tracked by political pressure from Sanpete County.

Prior to considering specific points in the NPSDEIS, we have several very important general comments.

First, the process used to create this document is questionable. It has been drafted in secrecy with no involvement with the representatives of Carbon County or any of the interested environmental groups. The Price River watershed is highly valued by outdoor recreationists and environmental advocates. Adequate high quality water availability is critical to the economy of Carbon County. What should be a responsible public process has been turned into a clandestine plan between 2 public agencies.

Second, we believe the need for the project is too narrowly defined. A more reasonable approach would be enhancement of irrigation on a countywide basis. There is every reason to believe that a combination of support from the Central Utah Project Water Conservation Program, re-programming the Small Reclamation Projects Act support, and a payment for the Narrows water rights by interested groups (Carbon County, Utah Power & Light, other government agencies, or environmental groups) would provide funds for a more realistic alternative project. Such an approach would bring a 70 year-old conflict to an end and produce actual benefits for Sanpete County.

Third, many of the critical studies needed to assess this project have been withheld from the public. Documents and studies used to produce the NPSDEIS have been kept secret and not made accessible. We have sought basic information from the BOR regarding this project, but

were informed that all information supporting this document was private under ownership of the Sanpete Water Conservancy District. We believe that comment period on both the NPSDEIS and the 404 permit should be extended to allow public review of these critical project documents.

1-6 Purpose and Need

The purpose and need presents two needs – irrigation and municipal water needs. The document should assess alternatives for each of these needs separately. The project also defines the irrigation needs in such a narrow manner that almost by definition only this project will meet the Need. A more realistic definition of project need would be to evaluate alternatives to increase water available for irrigation on a countywide basis.

66-1 **1-18 Interaction with Fairview Lakes – Need for an Operating Agreement**

It is stated that an operating agreement would be arranged with the Cottonwood-Gooseberry Irrigation Company following obtaining an approved EIS and Record of Decision. Typically, in this situation the later arriving water project must guarantee the yield of the earlier project. Such an action will tend to increase project costs and reduce project benefits particularly during times of low water conditions. Such an agreement would control releases to the small creeks below Fairview Lakes, use of the Narrows Tunnel and division of project yields. In the past such disagreement between water districts have been very difficult to resolve. In order to fully understand the project benefits and costs such a document needs to be produced and presented publicly before releasing other environmental documents.

66-2 **1-18 Interaction with Fairview Lakes – Additional wetland area**

It is stated that 2.6 cfs of water from Fairview Lakes will be released into two small, unnamed streams. Based on the project yield, this means that almost the entire Fairview lakes yield will be released into these 2 streams. One is a new channel. The other is a channel that has been carrying project water to the transmountain tunnel. At the base of Fairview Lakes in this area, there is a substantial wetland area. With the reduction in flow, this area will shrink. This wetland area should be delineated and mitigation provided for its loss.

66-3 **2-1 Financial Feasibility**

According to the NPSDEIS, the project must be financially feasible. This cannot be determined based on information provided in this document. Again, this is a public process and a realistic discussion of the project's finances needs to be presented in a manner that allows for an assessment of the project's finances. Based on the more recent re-assessment of the project conducted by CH2MHill for the Central Utah Water Conservancy District working closely with the SWCD, the cost figures in the NPSDEIS seem open to question.

66-4 **2-13 Narrows Tunnel Rehabilitation**

It is stated that the Narrows Tunnel will be redone as part of this project. In the past, this was considered as a CUP 206 project. It is unclear in this document whether that is still the case. Will the 206 program pay a portion of the cost? How will the cost be allocated between the Narrows Project and the Cottonwood-Gooseberry Irrigation Company?

2-14 Fishery Mitigation Plan

66-5 We regard the fishery mitigation plan as inadequate. In the west, we deeply disagree with the provision artificial stream enhancement to replace loss of stream flow. Stream flows losses should be mitigated with acquisition of water for instream flow.

Gooseberry Creek (UDWR Class 3B - Unique) and Upper Fish Creek (UDWR Class 2 - Unique) are high value stream fisheries, those stream segments above Narrows, Cottonwood Creek, Mud Creek, Winterquarters Creek, or Pondtown Creek do adequately mitigate the loss of these two high value stream segments. At present, it is unclear whether there are willing sellers of these segments. It appears that the Mud Creek segment is not available.

The stream segments on upper Fish Creek and the Price River below Scofield have not been identified.

Finally, the document indicates that these five stream segments as well as sections above Narrows and below Narrows will be managed by the UDWR or the Forest Service. This would represent a yearly project cost that should be added to the project budget with a cost of living adjustment and a provision for periodic replacement.

66-6 **2-28 Mitigation Funding**

In multiple locations in this document, such as on page 2-28, it is stated that the SWCD will be responsible for "funding and acquiring all land and easements". Conversely, on page 2-31 it is stated these are "costs are nonreimbursable to the project sponsor." What exactly is the legal basis for the BOR declaring these costs as "nonreimbursable"?

2-31 Narrows Project Cost Comparison

66-7 The NPSDEIS has a cost estimate of $40 million for the current project. The 2008 Final Report, Update to the Sanpete County Master Plan presents a cost estimate of $59 million and this estimate did not include the "engineering for the project, contract administration, land acquisition, permitting, environmental documentation or any mitigation that might be required". This estimate was prepared by CH2MHill for the Central Utah Water Conservancy District working closely with the SWCD. The CH2MHill report represents the only partially neutral examination ever done on Narrows. There is a need to reconcile these cost estimates.

2-31 Table 2-5 Narrows Project Costs Comparison

66-8 Under the proposed Action, $1.065.000 would be allocated to a Recreation Area and this would be a cost paid by the BOR. It is unclear how this funding would be arranged. In addition, according to the Fish and Wildlife Coordination Act Report, there would be a loss of 4,500 angler days at Schofield and an increase in 13,700 angler days at Narrows. 33% of this cost would in a sense be a replacement for losses at Schofield and consequently should be a cost allocated to SWCD as opposed to being paid by the Federal Government.

2-47 Alternatives Considered and Eliminated from the Study – Conservation Without Development of Other Water Supplies

66-9 Over the last 10 years, an impressive array of water conservation projects and alternative projects have been produced in cooperation with the Central Utah Water Conservancy District. Basically, more twice the amount of water provided by Narrows has been produced at a fraction the cost. The Sanpete County Master Plan as updated contained a list of additional water conservation projects that were not constructed. This section of the NPSDEIS seems

intentionally evasive. The list in the Master Plan should be updated and provided as a comparison to the proposed Narrows Project.

66-10 **2-58 Alternatives Considered and Eliminated from the Study – Conservation Through Retirement of Irrigation**

Again, the document is evasive. What has been the cost of recent land transactions in Sanpete County? We have been approached by several farmers in the Indianola area with the idea of selling the farms to transfer the water into San Pitch Drainage. Finally, and most disturbing, on page 1-12, the NPSDEIS acknowledges that within the project area, 33% of the currently irrigated land is considered marginal due to "poor soil, inadequate drainage, or topographic characteristics". Even more disturbing, on page 2-58, the NPSDEIS is actually misleading when it says that 2,760 acres would need to be retired or "18% of the 15,420 project-eligible lands" would have to be retired. Again, according to the NPSDEIS, there are 7,760 marginal acres of land being irrigated within the project boundaries. Consequently, there is abundant land that could reasonably be retired to provide additional water to better, more productive areas.

Other alternatives – Restoration of Current Transbasin System

As part of the preparation of the 2008 Final Report, Update to the Sanpete County Master Plan, we submitted a list of current transbasin diversions transporting water into Sanpete County. Many of these diversions are poorly maintained and like the Cottonwood-Gooseberry Irrigation Company's transbasin tunnel are in need of repair. In addition, the canal bringing water into Fairview Lakes is earth-lined and in need of lining in certain segments. Again, like the land retirement option above, some of these companies might seriously consider selling their diversion systems rather than continue maintaining them. Finally, these systems might function well on normal years, but on dry years their yield probably becomes even more limited.

3-4 & 1-19 – Upper Colorado River Endangered Fish Recovery Program

66-11 The Stonefly Society primarily funded the initial investigation that collected the first pike minnow in the lower Price River. We believe that stream segments such as the Price which have not had the severe problems with non-natives that are occurring on many stream reaches in the upper basin might be especially critical for the Recovery Implementation Program (RIP). A reference is given regarding the RIP flow recommendations for the Price. The reference does not lead to information on this issue. The recovery program was noted later in this document. Past studies have indicated that the lower Price River contains a relatively large percent of it biomass in native fish relative to other stream and river segments in the upper Basin of the Colorado River. Releases and spills for flushing flows in the Price might be especially critical for the RIP. Such flows might be much harder to create with the Narrows in place. The recommendations were to be released in the fall of 2009. Again, a Record of Decision based on this NPSDEIS should be delay pending the release and review of these flow recommendations.

3-11 – Hydrologic Studies

In past examinations of the Narrows Project, the Stonefly Society has funded a hydrologic investigation of the Narrows and also carefully reviewed data made available by project sponsors. Our conclusion was that there was not adequate water available in the Gooseberry Basin to both meet the projects stream flow obligations and the project water deliveries especially during times of low water yield. This type of access and review has not been possible with the current restricted access. On page 3-11 reference is made to 6 hydrologic studies

conducted by the BOR. These studies appear to be critical to understanding this NPSDEIS. They need to be made freely available and examined independently.

3-18 – Hydrologic Studies – Need for Scofield Replacement Water

66-12 The ability to store water in a Narrows Reservoir will depend upon Scofield having adequate water in storage to replace direct flow water rights. On page 3-18, it is stated that Scofield will be drained to the bottom of active storage 12 times in 43 years as opposed to 3 times in 43 years under the No Action Alternative. At these times, Narrows would have to stop storing water and start making releases to meet direct flow rights in the Price Basin. It is probable that during periods of low water yield in the Price Basin that such water will not be available. A discussion of this possibility needs to be included in the NPSDEIS.

3 – 18 Scofield Conditions and Threats to Rooted Macrophytes community

66-13 The present condition of Schofield is of great concern. It should be considered as a shallow lake. Its current state as a clear shallow lake represents a very high value water supply and recreational resource. The literature on shallow lakes shows that such lakes are highly vulnerable to conversion from a clear state to cloudy turbid conditions. Both shifts in phosphate loading or greater water level fluctuations will place the state of the reservoir in jeopardy. Such a switch would be an environmental catastrophe. The value as a reservoir fishery would be

66-14 destroyed. The Price River below Scofield would be destroyed as a trout fishery. Finally, it is probable that water users downstream would face serious problems in water treatment. In addition, once such a shift occurs it is very difficult to reverse the condition. At this point, an outside review by a qualified limnologist would be a reasonable first step in considering the problem. A reasonable solution would be for the operation of Narrows to be contingent upon continued maintaining clear water conditions at Scofield.

Instream below Scofield

66-15 The Stonefly Society has had a long-term interest in flow conditions in the winter flow conditions below Scofield. At present there is no water released during the winter and the streambed is dry destroying what should be one of Utah's finest trout streams. We regard this as the most significant problem on the Price River. Both Narrows and Scofield Projects are not functioning in an environmentally responsible manner.

66-16 **Need for Scofield Operating Agreement**

Much like the Jordanelle-Deer Creek system, there will be a need for a Narrows-Scofield Operating Agreement. Many years there is very little water that can stored at Scofield and almost the entire flow belongs to direct flow water right holders. The project functions only because of holdover water in the reservoir. The status of holdover water in the reservoir will be difficult to determine.

66-17 **3-19 & 20 Impact of Loss of Periodic High Flows at Woodside**

The NPSDEIS displays the loss of periodic high flows occurring at Woodside. The NPSDEIS points out that the very, very high flows occurring only once or twice in the period of record would still occur, but the years of moderate high flows would be almost completely lost. The NPSDEIS needs to give an assessment of what impact this change will have.

66-18 **2-21 Reduction in External Phosphate Loading to Scofield Reservoir**

This is a critical issue in maintaining water quality in Scofield Reservoir. However, since there is no specific mitigation plan presented in this document, other than the protection of several stream segments. Conversely, with increase in recreational activity upstream from Scofield, there is potential for increased phosphate loading to occur.

66-19 **2-22 – MOA on Fishery Measures**

It is stated that such a document will be created. To date no such document exists. Consequently, the adequacy of the plan cannot be assessed. The NPSDEIS budget states that all mitigation measures will be paid for by the BOR. Is this also true of the operation and maintenance expenses also? If so, what is the budget authority that will cover this cost?

We continue to be deeply concerned about this water project and believe that the severe impacts of this project represents a significant threat to Utah's environment and to the economy of Carbon County.

Sincerely,

Frederick W. Reimherr
Stonefly Society Chapter Trout Unlimited

67. UTAH RIVERS COUNCIL, ROSALIE WOOLSHLAGE, STAFF ATTORNEY

Crookston, Peter L

From:	Rosalie Woolshlager [rosalie@utahrivers.org]
Sent:	Tuesday, June 01, 2010 6:24 PM
To:	PRO NarrowsEIS
Cc:	rosalie@utahrivers.org; 'Zach Frankel'; jacob@uec-utah.org
Subject:	Utah Rivers Council Comments re Gooseberry Narrows Project and Utah Environmental Congress Adoption of URC Comments
Attachments:	Utah Rivers Council Comments on Narrows Project SDEIS 6.1.10pdf.pdf

Utah Rivers Council
protect·restore·explore

May 31, 2010

Mr. Peter Crookston
PRO-774
Bureau of Reclamation
302 East 1860 South
Provo, Utah 84606-7317
narrowsSDEIS@usbr.gov
Via email and U.S. Mail

Re: Utah Rivers Council Comments Regarding *Narrows Project Supplemental Draft Environmental Impact Statement*

Dear Mr. Crookston:

On behalf of Utah Rivers Council, its members, staff, board and volunteers, I write respectfully to submit the following comments regarding the *Narrows Project Supplemental Draft Environmental Impact Statement* ("SDEIS") issued by your agency ("BOR") on March 29, 2010.

Utah Rivers Council ("URC") is a not-for-profit 501(c)(3) grassroots community-based organization that advocates for sound water policy and protection and conservation of Utah's rivers, streams, and clean water sources for today's citizens, future generations, and wildlife. The URC has a long history of involvement in the Gooseberry Narrows project ("Narrows Project" or "Project"). After careful deliberation and over 15 years of research, we believe the Project is an exceptionally poor use of tax money because of its staggering cost per delivered acre-foot of water, its destruction of sensitive riparian areas and fisheries, and the threats it poses to downstream human water supplies and economies.

For over ten years, we have been aware that the Central Utah Water Conservancy District ("CUWCD") has been heavily involved as a proponent of the Narrows Project. We would like an accounting from your office as to the role of the CUWCD in this Project.

1

The Narrows Project, as set forth in the SDEIS, is a relic of a bygone era, and is fundamentally flawed in a host of ways. It is neither economically nor politically feasible, and runs against the Bureau's own policy mandates regarding trans-basin diversions. It is under active and continuous protest from a number of organizations and parties in both the public and private sectors. The very program under which it is to be funded has been eliminated by Congress, and exists only under a grandfathered provision affecting fewer than a half-dozen small projects nationwide.

Opposition to the Project extends beyond the boundaries of Carbon and Emery counties. Conservationists, environmental and pro-fishing groups such as Trout Unlimited, Stonefly Society, and Utah Sierra Club all oppose the Narrows Project because of environmental damages, degradations and dewatering. Many of the owners of an estimated 500 recreational homes that have been built in the Scofield area, which will face impacts from the Project, are Utah citizens from the Wasatch Front. Scofield Reservoir also is home to a State Park and Boy Scout camps. All of these groups would be adversely affected by the Gooseberry Narrows Project.

Our comments concern two general points: 1) that the SDEIS for the Project fails its purpose under NEPA and is wholly inadequate; and 2) that the Project is as harmful and wasteful as when first proposed in 1993, and as such should not be funded through a loan through the Small Reclamation Project Act ("SRPA").

I. The SDEIS Fails to Fulfill Its Purpose and Mission Under NEPA.

The DEIS is inadequate and fails to comply with NEPA. First, and most importantly, it fails to provide the necessary data and analysis for BOR to determine if the SRPA loan should be approved or not. The DEIS states that, "Based on the analysis documented in the DEIS, the responsible official for Reclamation will make the following decisions: Whether Reclamation should approve SWCD's application for a SRPA loan to construct the Narrows Project."

67-1 The SRPA requires that a project be technically and financially feasible. In order to be financially feasible, among other things, the loan factor must be 0.5 or less. Since BOR's role in the project is limited to approval or disapproval of the SRPA loan, and approval is contingent upon the projects financial feasibility, then a significant portion of the analysis presented in the DEIS should have included a discussion of the financial feasibility of the project, the loan factor, project benefits, allocation of project costs, etc. Since this information was not provided, there is no basis for BOR to make its decision on whether or not the project is financially feasible or for the public to participate in this analysis.

The DEIS provides a fairly lengthy discussion of a proponents "willingness to pay" and how this "willingness to pay" an additional commitment of other financial resources might justify approval of a project that would otherwise not be considered financially feasible (have a loan factor of less than 0.5). We have not been able to identify any policy, regulation or law that supports this notion and further discussion is needed. Since the DEIS goes out of its way to describe this "flexibility", it is presumed that the project doesn't have 0.5 or less loan factor and is the project is not otherwise financially feasible.

In your response to these comments, please provide additional discussion on exactly what the loan factor is without the commitment of other financial assets, and how much additional financial assets are required by the project proponent to meet the loan factor requirement.

There is also a significant body of research that shows stated "willingness to pay" often diverges from actual "willingness to pay", often as great as twice the stated amount (List and Gallet, *What Experimental Protocol Influence Disparities Between Actual and Hypothetical Stated Values? Environmental and Resource Economics*, Volume 20, Number 3 / November, 2001). The federal government needs to play a much more integral role in determining whether additional financial commitments are in fact available or reasonably anticipated to meet the 0.5 loan factor requirement. These financial resources should be legally binding in the form of a bond, contract or other financial commitment. Is this a one-time payment or based on an income stream, and if so, what is the sources of this income stream. What is the likelihood that the sponsor will have the ability to make these payments. This analysis should be provided and examined prior to making a decision as to approval of SWD's SRPA loan application.

Moreover, the SDEIS fails to provide any compelling need for the Project. The need to provide additional outdoor recreation is hardly compelling. The DEIS bases the need for additional flatwater recreation on the 1985 and 1990 Utah SCORP (25 and 20 years old respectively) and the 1986 Forest Plan (24 years old). The interest and demand for flyfishing has far outpaced flatwater recreation and this project certainly does not meet this need. According to the DEIS, the Utah Division of Wildlife Resources does not recognize the creation of a reservoir fishery as adequate compensation for the loss of stream aquatic resources and there appears to be a net loss of recreation benefits resulting from the project. Since BOR's role in the Project involves approving or disapproving the SRPA loan request, then the project should be evaluated as a single purpose irrigation project and not a multipurpose project providing recreation and fish and wildlife benefits. The project sponsor, SWD, has no authority or special expertise to be expending federal funds on fish, wildlife and recreation and the need for additional fish, wildlife and recreation has not been demonstrated. The only apparent reason to provide recreation facilities is to allocate a higher proportion of joint costs to recreation so the project appears to be more economically feasible.

The Project would essentially provide sufficient water to provide three alfalfa cuttings per year compared to the two cuttings that now occur. The two cuttings that now occur don't even account for the conservation and efficiency measures that will be implemented under the No Action alternative. If you take into account these conservation and efficiency measures, it appears that you could get three alfalfa cuttings per year under both the proposed Action and the No Action alternative. Similarly, basing your need on a field trip report documenting reduced crop vigor and weeds is hardly the basis for investment particularly since the conservation and efficiency measures that are planned under the No Action Alternative were not in effect.

The need for additional M&I water is based on growth rates suggested by local officials. These rates are more than double those estimated by Utah Office of Planning and Budget. Planning should be based the projections of professional demographers at not the minor peaks in short term growth rates that may have been experienced. With all respect, County officials lack the expertise to forecast population an employment growth rates.

The Narrows SRPA loan application was not complete in 1994, at the time the SRPA program was essentially suspended, because the program had not been conducted in a businesslike manner beneficial to the federal government. Congress determined that new subsidized irrigation and agricultural projects would no longer be supported. Nevertheless, the Narrows Project has continued to stagger along: it has reportedly already incurred costs of over $1.6 million in nearly 40 years of controversy.

Pursuant to the SRPA, a plan and detailed cost estimate for the Project must be submitted "for review by the States of the drainage basin in which the project is located." 43 U.S.C. § 422d(a) (2007). The SDEIS acknowledges the Project's impacts on other Colorado River Basin states: "the project also would cause a depletion of about 5,597 acre-feet of water to the Colorado River system." SDEIS at S-20. However, nowhere is it indicated that BOR or any agency has submitted the SDEIS to any of the other five states in the Colorado River drainage basin. Thus BOR and Project proponents have failed to comply with the SRPA as well as NEPA.

67-2 Moreover, the data upon which the SDEIS for population and economics is so out-of-date as to be useless and misleading. Utah is in a new economic reality, facing a real estate and employment
67-3 crisis. Further, the United States and the entire world must address climate change, yet the DSEIS (unlike all recent NEPA documents to reach our office) fails in any way to discuss this urgent threat, let alone the Project's climate change direct, indirect, and cumulative effects. For this failure alone, the Project fails NEPA. The BOR should revisit the scoping stage, and only proceed with the Project when full NEPA compliance is achieved.

II. The Narrows Project Remains Harmful and Wasteful to Utah's Economy and Environment.

Although the economic boom-times that once may have made it seem viable are long gone, the environmental and economic harms that would be caused by the proposed Narrows Project have not lessened in the years since it was first envisioned. Those harms, all stemming from the dewatering of the headwaters of the Price River and construction of the dam/tunnel project, include grave threats to Carbon County's water supply and economic well-being and grave threats to the natural environment and ecological communities that rely on the flowing streams, upstream and downstream in and along the Price River.

Moreover, the Narrows Project is even more a waste of taxpayers' dollars and scarce economic resources than ever. A loan under the SRPA would be a risky mistake for BOR and taxpayers.

First, the Project endangers the water quality, water supply, and economic future of Carbon County. It is slated to destroy the headwaters of the Price River, including high-elevation meadows and wetlands. In addition to damage from direct flooding, dewatering, road-moving, dam- and tunnel-building, the BOR expects to withdraw 2,400 acres of pristine National Forest lands to serve as staging and gravel sources for the Project.

Operation of the Narrows Project will drastically reduce flows downstream. Downstream of the dam, the following flow reductions are predicted: 1) Upper Gooseberry Creek: 74% reduction; 2) Lower Gooseberry Creek: 43% reduction; 3) Fish Creek: 3-24% reduction. As a result of low water

levels, water quality and habitat in all the creeks and in Scofield Reservoir will decline. This dewatering is the basis for the catastrophic environmental and economic harms downstream.

The Project will reduce water levels in Scofield Reservoir, Carbon County's primary water supply. Due to these reductions, BOR has admitted that Carbon County would be faced with "the potential for serious drought consequences" as a result of the Project.

As the mid-2000s drought cycle demonstrated, there is simply not enough water in the system above Scofield Reservoir, even without the Narrows Project. During the drought, Scofield Reservoir dropped – without excess water currently discharged from mines upstream it would have been nearly empty. To take more water from the system through the Gooseberry Narrows project will
67-4 have catastrophic effects during the next inevitable drought. In terms of human health, Scofield's decreased water quality may lead to outbreaks of gastrointestinal illnesses, similar to what has occurred during pervious droughts.

67-5 For water users and holders of water rights, the Project is likewise untenable. Water in the Price River Basin is already over-allocated. The Project will exacerbate that problem and produce a climate ripe for conflict. It would virtually guarantee northern Sanpete County water users 100% of their yearly water allocations even during drought cycles. Yet Carbon County water users, with equally valid water rights, could expect in many years only fractional parts – 50%, 25% or less – of their yearly water allocations. This patent unfairness must be addressed by the BOR now, or it will be addressed in the courts later.

Because Carbon County has no alternative water supply, local economic growth will be stifled, possibly leading to negative growth and out migration. The 5,400 acre-feet sought by Sanpete Water District could support over 20,000 people: potential population growth, jobs, and economic expansion for Carbon County that will simply vanish with the diversion of water.

Tourism is an important industry and one under threat from the Project: at least 11% of Carbon County jobs and over $36 million in income come from tourism, with fishing and recreation in and around Scofield Reservoir and Fish and Gooseberry Creeks a major component. Similarly, property values throughout Carbon County will decline as the scarce water supply pervades the community and hinders future growth. Recreation-based revenue from Scofield Reservoir will also decline while revenue generated from fishing streams, especially Fish Creek, will disappear.

Even PacificCorp's Price Canyon power-generating plant is in danger: diverting additional large quantities of fresh water away from Price Canyon, as the Narrows Project would do, could lead to shut-downs of the Carbon Power Plant during drought cycles. The plant requires 3,000 acre feet per year of water to generate electricity. If water is not flowing in the Price River, PacificCorp faces buying water at market rates (passing the premium on to Carbon County customers) or shutting off the lights. Therefore, Rocky Mountain Power opposes the Project as well.

In addition to higher rates and less water, public safety in the Price/Helper/Wellington/Carbon County area will be endangered because local fire departments
67-6 won't have the necessary water reserves to fight fires. Further danger is built in to the Project: the proposed Narrows Dam is only designed to withstand a 5.5 level earthquake (whereas the Scofield

Dam was retrofitted by the BOR to withstand a 7.5 level earthquake) and the dam site is located in a geologic formation notorious for landslides.

Second, the Project will cause irreparable harm to the natural environment, not just in the flooded area but in the wetland, riparian, and upland areas for the entire 100-mile length of the Price River, its tributaries, and streams in the San Pitch drainage.

67-7 The Project will harm wetland hydrology. Riparian wetlands along the Gooseberry, Fish and Cottonwood Creeks will be altered by flow depletions and augmentations. Sediment-starved water releases will laterally erode or downcut middle Gooseberry Creek and drain adjacent wetlands. The Project could reduce Gooseberry Creek inflows by 91%, essentially drying aquatic bed/shallow marsh wetlands associated with lower Gooseberry Reservoir. Two hundred fifty acres of shallow water littoral zone associated with Scofield Reservoir will face drastic impacts through reduced water flows. During critical spring months, the water table supporting middle Gooseberry Creek wetlands may decline by 1.4 feet to 1 foot after construction of the Narrows Dam.

The Project will destroy several miles of pristine high-mountain streams, over 100 acres of sensitive wetlands, and countless acres of riparian habitat. The roadless nature of the drainage also
67-8 makes this one of the region's most valuable elk calving grounds. The disruption of the area due to dam construction and the subsequent road access will essentially eliminate the entire area as an elk calving area, putting increased pressure on one of the state's most popular game species. The BOR has failed to address exactly how these losses will be mitigated.

The Project reservoir will also flood one mile of upper Gooseberry Creek and 4.3 miles of small streams tributary to Gooseberry Creek. Still maintaining the Outstanding Values, including wildlife, habitat quality, diversity of species, and abundance of species, that made them eligible for protection under the Wild and Scenic Rivers Act, Gooseberry and Fish Creeks are highly valuable headwater tributaries to the Price River, which is a tributary to the Green River. Each creek retains its wild character, beautiful scenery, and lush riparian and upland habitats. The Forest Service has chronicled some of the creeks' outstanding features, including high quality habitat for fish, diverse wildlife habitat, and healthy riparian areas.

These headwater tributaries are deserving of protection because of the function they perform: critically influencing the character and quality of downstream waters. The health of headwater tributaries reflects on the health of the entire downstream river system. They support riparian wetlands which in turn support flood control. Those same wetlands filter nutrients that might otherwise enter the stream. They also provide significant high elevation wildlife habitat that is increasingly rare elsewhere because of human encroachment. Therefore, the protection of a headwater stream benefits not only that tributary, but serves to enhance the functions of larger downstream systems.

Fish and Gooseberry Creeks are headwater streams critical to the integrity of the Price, Green and Colorado River system. They function to provide ecosystem services such as natural flood control, groundwater recharge, sediment retention and water quality improvement, nutrient recycling, and the creation and maintenance of biological productivity downstream. There are very few free-flowing tributaries remaining in the Colorado River system. Those segments that persist without impoundments are unimpaired and are critical to the integrity of the overall system.

The Gooseberry and Fish Creek riparian wetlands function to improve water quality downstream. Given the pressures facing the Price River in the form of agricultural run-off, stormwater runoff, and over-grazing, the high quality flows from Fish and Gooseberry Creeks are critical to off-set poor water quality entering the system downstream.

67-9 In recognition of the scenic and natural qualities of the drainage, Fish Creek has been designated a National Recreation Area, and has had one of the very few national equestrian trail facilities in the state constructed to allow horseback riding enthusiasts to enjoy access to miles of roadless backcountry. Construction of the Project will directly and adversely affect this National Recreation Area.

Fish and Gooseberry Creeks are unique because they are accessible to anglers of all ages and abilities. Furthermore, the fish species variety makes these segments unique in that the catch is unpredictable. Because of the densely vegetated stream banks and the cover they provide, large fish are abundant. These characteristics make Fish and Gooseberry creeks highly valuable to both local and state-wide anglers.

67-10 Families, groups, and individuals visit and use the pristine Fish and Gooseberry Creek corridors for outdoor enjoyment. Activities range from fishing, hunting, hiking, and camping to the use of creek water for municipal supplies in Carbon County. Individuals who were baptized in Fish Creek still hold it dear to their hearts. Others value these creeks because they spent significant time on them as children or because they provide irrigation flows to farms and ranches that have been in the family for generations. The Carbon County community has significant cultural ties to these two creeks that make them invaluable as cultural and historical resources.

As Utah's urban areas grow and expand into formerly rural areas, the importance of headwater creeks such as Fish and Gooseberry Creeks only increases. It is important to provide places for people to observe unique wildlife, solitude, healthy air and clean water. Fish and Gooseberry Creeks provide such a resource as evidenced by the abundant fish and wildlife that use this corridor and the number of people who recreate here.

The Project also threatens Scofield Reservoir, Carbon County's main water supply and by size, far and away the most productive trout fishery in the State of Utah. It is second in actual production of trout only to Strawberry Reservoir, though only a tenth its size. The lake is very shallow, and its fishery biology is tied directly to a very large chironomid that is abundant in the lake, as well as to
67-11 water temperature and even more importantly, to flush rates. To our knowledge, there has been no detailed, independent, and credible survey whatsoever of the impact that the diversion of Fish Creek, the lakes's primary source of water, would have upon the fish, or upon the insect that sustains them. BOR's own Resource Management Plan ("RMP") recognizes that Scofield should be managed as an outstanding recreation site, and that such recreation is primarily tied to its fishery.

67-12 With the Project, the likelihood of fishkills in Scofield Reservoir also drastically increases as water quantity and quality decline. BOR's RMP for Scofield readily acknowledges that flush rates are a critical component of the lake's biology. Because the body of water is quite shallow and because of relatively high phosphorous levels, there occurs an annual algae bloom each summer. Unless enough water remains in the reservoir or comes into it late in the season, there is a very real threat of a

massive eutrophication, whereby large portions of the lake go completely anoxic. This would result in massive fish kills, as BOR recognizes have happened in past low-water events.

The importance of Scofield Reservoir to the citizens of Carbon County cannot be overstated.
67-13 Historically, Scofield Reservoir only spilled 33% of the time or 21 years in the last 63. As a matter of fact, during one of Carbon County's drought years on June 19, 1991, Scofield Reservoir's maximum active storage was only 3,000 acre feet out of a maximum active storage of 65,800 – or less than 5% capacity. This amount of water represents only 10% of what Carbon water users actually use if available with their valid water rights – 30,000 acre feet per year.

Even with several years of severe water restrictions in place during a recent drought cycle, water levels at Scofield Reservoir became so low that in the fall of 1991, Carbon County's Road Department's personnel and heavy equipment were dispatched to dredge Scofield Reservoir so the County would have enough water to meet the essential needs of its citizens. Had the Narrows Project been in place during this time, Scofield Reservoir would have been completely out of usable water at least one or two years before the drought finally ended and 20,000 citizen lives and property would have been put in jeopardy.

67-14 To comply with NEPA, BOR should undertake and include in its EIS documentation a complete and independent biological review of the Scofield reservoir, including the impacts of the proposed dam on flush rate, eutrophic cycles, threats to both the fish and the fishery, insect life cycles
67-15 and sensitivities, phosphorous and other nutrient factors, and littoral zone impacts. Moreover, in accordance with Section 2 of the Federal Water Project Recreation Act, please show what costs have been allocated to recreation and fish and wildlife enhancements. Which of these costs are separable costs and which of these costs are joint costs? What are the benefits of recreation and fish and wildlife and what is the cost of providing recreation or fish and wildlife enhancements benefits of reasonably equivalent use by the least costly alternative?

The harms this Project will cause to the flowing upper Price River headwater streams, Scofield Reservoir, and along the full length of the Price River manifest in harms to wetlands and riparian areas and the fish, birds and other wildlife that rely upon them for survival.

Over 100 acres of wetlands will be inundated, and decreased water flows from the Project will directly, seriously, and immediately degrade and destroy some of the healthiest riparian areas in the entire state. Wildlife biologists suggest that nearly 90% of wildlife species use riparian zones at some point in their life cycles, especially in an arid state like Utah.

Healthy, fully functioning riparian corridors are rare in Utah – in fact it occupies less than 1 percent of the state's land cover. However, 75 percent of Utah's bird species use riparian habitat to nest, forage, water, migrate and/or winter.

The riparian habitat that makes the Price headwaters area unique is composed of extensive tracts of willows and cottonwoods with a variety of species and age-classes, including Salix boothii, S. drumondiana, S. lasiandra, and S. exigua. According to *An Evaluation of the Possible Effects of the Proposed Narrows Reservoir on Two Stream Segments Eligible for Inclusion in the Wild and Scenic River System*, issued by the U.S. Forest Service in 2004, it is "the quality and diversity of the willows in these stream segments that make them regionally important for wildlife. The current flow regime in

this system has contributed to the development and maintenance of the willow complex that forms the underpinning of the outstanding remarkable value for wildlife." In a state where few rivers or creeks remain unaltered by some sort of dam or diversion, it is rare to find a waterway that supports a healthy, robust, and diverse willow/cottonwood wetland system.

Within the riparian corridor, the soils are cryoaqualls, histic and highly organic. Such soils act as sponges to absorb high flows in the spring, and release them slowly into the stream as the summer progresses. They increase the potential of riparian wetlands to provide nutrient transformation, biodiversity and uniqueness/heritage functions. Their sponge-like absorption is critical to prevent downstream scouring of the streambank and bed. The flows released late season are invaluable to downstream water quality and fish and wildlife habitat, especially in the arid environment of the Price River basin. In fact, the Sacramento District of the Corps of Engineers restricts histosols, including fens, from permitting under certain Nationwide Permits because they are unique and deserving of special protection.

67-16 The willow-filled drainages of Gooseberry and Fish Creek provide Utah's only documented habitat for the southwestern willow flycatcher, a federally threatened species. The drainage represents a healthy natural mid- altitude riparian ecosystem with natural drainage patterns, one of the most rare habitat structures in the state. The drainage is naturally regulated by a healthy beaver population, which stabilize drainage fluctuations to the degree necessary to assure healthy willow stands along nearly the entire drainage. The resulting riparian footprint of the stream is much wider than would be possible if the stream flow were to be controlled by upstream impoundments.

These riparian willow communities now face inundation from the Project, and even unflooded areas will be vulnerable to intrusion by non-native invasive species such as clover, yarrow and thistles resulting from project-related changes to spring flow levels.

Wildlife will be harmed by the Project up and down the Price River as well. The Project will reduce habitat for spawning populations of native Bonneville cutthroat trout. The Fish Creek drainage are home to Utah's most robust natural cutthroat trout spawning run. This drainage is the major tributary to Scofield Reservoir, for its size the most productive cold-water trout fishery in the state. Each spring it is the site of a massive spawning run. Many thousands of large, actively-spawining fish can be easily seen from the trails, and redds are carefully protected from wading damage by strict fishing regulations which prohibit fishing until after the eggs have had the opportunity to hatch and the fry move out of gravel and into vegetation. The scope of the run and the vigor of the fish are unique to Utah.

Even more critical for purposes of the law, reduced flows in the lower Price River will harm spawning habitat for the endangered Colorado River Squawfish. The Price River Gorge, comprising the lower 35-40 miles of the Price River above its confluence with the Green River, is a nearly-40,000 acre roadless Wilderness Study Area. The temperature of the free-flowing Price River becomes quite warm as it makes its way through the desert, and the warm water provides a rare suitable spawning
67-17 ground for the endangered Squawfish. Likewise, the riparian corridor through the Gorge hosts literally scores of species, and though it is proposed wilderness, the SDEIS has entirely failed to analyze the impacts of Price River diversion on this precious unique Gorge and the Squawfish critical habitat there. Such a failure is a violation of the Endangered Species Act. Please respond as to how

BOR and proponents plan to protect this endangered species and WSA and why this information was omitted from the SDEIS.

While the DSEIS fails to include conclusive studies of the harms the Project will cause to bird populations, the Forest Service recognizes portions of Fish Creek's riparian zone to contain the highest density of flycatcher species in the state. The area has been described as an "outstanding example of good riparian management... good riparian habitat, as found in the Upper Fish Creek drainage, is important for this species. Willow Flycatchers can be found from the inlet into Scofield Reservoir to the confluence with Gooseberry Creek ... As evidence of this 54 species of birds have been observed in Fish Creek during the breeding season."[1] Species include the Red-napped sapsucker, Northern goshawk, Broad-tailed hummingbird and Yellow-breasted chat. The water courses also provide habitat for diverse raptor species, such as golden eagles and red-tailed hawks. The Project seriously threatens habitat for all these species, as well as the deer, elk, beaver, black bear, and moose that use the riparian areas for forage, nesting, and habitat.

67-18 Moreover, higher concentrations of boron and selenium resulting from diminished water quality may reduce the reproductive success of threatened Columbia Spotted Frog populations and other amphibians, as well as reptiles and invertebrate species in the drainages.

Section 6(b) of the Federal Water Project Recreation Act requires costs allocated to Fish and
67-19 Wildlife Mitigation to be reimbursed. In response to these comments, please show how fish and wildlife mitigation have been allocated and that they are reimbursable and included as part of the economic feasibility analysis.

In providing a miniscule benefit to a few, for a staggeringly high cost, with all the harms set forth above, the Project is a waste of taxpayer money. The proposed dam will cost at least $40 million to deliver 5,400 acre-feet of water at a whopping cost of $7,407.00 per acre-foot. Sanpete water users already divert an estimated 10,000 to 20,000 acre feet of water per year from Carbon and Emery Counties.

The BOR even admits that the project's cost cannot be accurately predicted. Although the Project is supposedly a 'loan', it is really a sweetheart deal made at the expense of taxpayers. Better and cheaper alternatives exist. Currently, the water goes towards high-value uses (industry and municipal use) whereas the Project will convert most of the water to a low-value use (supplemental irrigation for subsidized alfalfa production). No new land will be put into production by the Project. The Sanpete Water District has proposed a complicated plan involving much long-term management. They have "promised' to do this, but have not offered any type of fully funded endowment to insure full and ongoing mitigation.

Sanpete County has already been given substantial public assistance in expanding its local water supplies in a manner that has been highly cost effective with few (if any) adverse environmental impacts. The cost to produce the Narrows water far exceeds the market value of water in Sanpete County. It also far exceeds the cost of water saved through water conservation efforts - the main alternative to the Narrows Project.

The BOR must provide detailed quantification of the hard costs of the proposed dam, and a study of the lost costs to the state due to the loss of fisheries and habitat in all three affected bodies of

water. Such studies should include accurate accounting of the use of the Scofield, Price River, and Fish Creek drainages by fishermen, hunters, and recreationists and equestrian enthusiasts.

III. Conclusion

In conclusion, the era of large federal dam-building projects for irrigation is over. The Narrows Project is not viable environmentally, economically, or politically: it is a boondoggle and a waste of scarce taxpayer dollars. The catastrophic harms it will bring to pass on the human and riparian communities that rely on Price River drainages and water are not worth the huge $40 million price tag and the miniscule and dubious benefits. The SDEIS is fatally flawed, and the Bureau of Reclamation should decline to authorize the Narrows Project and reject SWD's SRPA loan application. We look forward to your written responses to the questions contained herein. Thank you for the opportunity to provide these comments.

Sincerely,

Rosalie Woolshlager
Staff Attorney

68. Western Wildlife Conservancy, Kirk C. Robinson, Executive Director

ORIGINAL

PRO OFFICIAL FILE COPY
RECEIVED
MAY 27 '10

Western Wildlife Conservancy

Protecting wildlife and wildlife habitat in the Intermountain West through research, education and advocacy

68 S. Main St., Suite 4
Salt Lake City, Utah 84101
(801) 468-1535
Fax: (801) 466-9513
lynx@xmission.com
www.westwildcon.org
www.findthewolf.net

Reply Date		
Date	Initial	
		100
		105
		107
	KS	700
5/28/10	BCA	770
5/28/10	PC	774 cy

Action:
Classification: ENV-6.00
Project: Narrows
Control No.: 10036150
Folder I.D.: 1122814

May 26, 2010

Mr. Peter Crookston
PRO-774 Bureau of Reclamation
302 East 1860 South
Provo, Utah 84606-7317

Mr. Timothy R. Witman
Project Manager, Regulatory Division
U.S. Army Corps of Engineers
533 West, 2600 South, Suite 150
Bountiful, Utah 84010

Gentlemen:

68-1 On behalf of Western Wildlife Conservancy, a non-profit wildlife conservation organization with headquarters in Salt Lake City, I am writing to you out of concern regarding the Sanpete Water District proposal to divert water from the Price River watershed in Carbon County west into Sanpete County. WWC is adamantly opposed to this idea. John Wesley Powell realized the wisdom of settlements adjusting to the arid climate of the West and to constraints imposed by watersheds. Additionally, we now know that diverting water out of a watershed in large quantities is ecologically unsound.

Our concerns include:

- the $40 million price tag, and who will bear this cost
- the probable negative effect on the culinary water supply for Carbon County communities
- potential negative effects to Scofield Reservoir for water storage and recreation
- negative impacts to the riparian ecosystem of the Price River
- negative impacts to the endangered Colorado River squawfish

Additionally, the best scientific information available suggests that global climate change will affect the region negatively, probably resulting in decreased amounts of annual precipitation in decades to come. It seems unwise to do something that will make Sanpete County residents dependent upon water that Carbon County residents will surely need in the future. Why should Sanpete County residents get water that, by rights, belongs to Carbon County residents? This is an arid land. All of us had better learn to live within our means.

Sincerely,

Kirk Robinson

Kirk C Robinson, PhD, JD
Executive Director, Western Wildlife Conservancy
68 South Main St., Suite 4
Salt Lake City, Utah, 84101

BUSINESSES

69. **Anderson Service Center**
70. **Aspen Groves Assets, David Asay, Coordinator**
71. **Castleview Hospital, Jeffrey Manky, MD, CEO Castleview Hospital**
72. **Castleview Hospital, Max Morgan, Castleview Hospital**
73. **CentraCom, Eddie L. Cox, President**
74. **Ephraim Mini Storage**
75. **Fairview Land and Livestock Company, Jack McAllister, President**
76. **Hard Hat Furniture and Appliance, Paul Hoffman, Owner**
77. **Madsen Chiropractic, Charles Howard, Owner**
78. **Moroni Feed Company, Kent Barton, President**
79. **Moroni Feed Company, Brandon P. Olson, Chief Financial Officer and Vice President**
80. **PacifiCorp, Cody Allred, Water Resources Engineer**
81. **Sacco Brothers Land and Livestock, Rex Sacco**
82. **Sanpete County Broadcasting Company, Douglas L. Barton, President**
83. **Time and Thrift, Robin Anderson**

69. ANDERSON SERVICE CENTER

AL

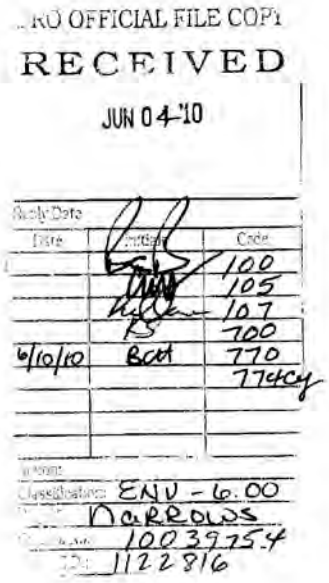
ORIGINAL

Crookston, Peter L

From: Anderson Service Center [asc@cut.net]
Sent: Wednesday, May 26, 2010 5:39 PM
To: PRO NarrowsEIS
Subject: Narrows Project

To Whom It May Concern,

69-1 The water that is to be used for the Narrows project has already been proven by both the Utah Supreme Court and the US Department of Justice to be rightfully Sanpete County. Since the 1930's water storage has been promised to Sanpete County that is in significant need of the water promised nearly 80 years ago.
By building the Narrows project the farmers (which I am included in) would benifit from the water profusely.



70. ASPEN GROVES ASSETS, DAVID ASAY, COORDINATOR

ORIGINAL

PRO OFFICIAL FILE COPY
RECEIVED
APR 20 '10

ASPEN GROVE ASSETS, INC.
11355 E. 16000 North
Mt. Pleasant, UT 84647

Reply Date		
Date	Initials	Code
		100
		105
		107
	KS	700
5/20/10	BLM	770
5/28/10	PC	774 cy

Action:
Classification: ENV - 6.00
Project: Narrows
Control No: 10029026
Rec'd: 4/22/10

April 19, 2010

Peter Crookston
PRO-774
302 E. 1860 South
Provo, UT 84606

Dear Mr. Crookston:

70-1 We own 800 acres in the Mt. Pleasant area of Sanpete County. While most of our land is agricultural, we also encompass the Pine Creek Ranchos subdivision which has 103 lots. We own 44 of those lots and have sold many to people currently building homes in the area. We work hand in hand with the area's water district and are extremely conscious of the water needs of our area.

Our county needs water! For ourselves, we have promoted water conservation and supported every viable effort to stretch that water. We have plans to add more acreage under cultivation and our area is growing triple the county average. The Narrows Project is the best alternative to addressing the water needs of this end of the county.

From what we have studied about the proposal, the environmental impact is negligible, state resolutions have been passed approving the dam to be built and it just makes sense to get Sanpete the 5400 acre feet of water due to the county.

We fully support the Narrows project and urge all of our elected officials to do the same. Please help get the water flowing!

Cordially,

David L. Asay
Project Coordinator
Aspen Grove Assets

71. CASTLEVIEW HOSPITAL, JEFFREY MANKY, MD, CEO

ORIGINAL

Reply Date		
Date	Initials	Code
		100
		105
		107
		700
		770
		774Cy

Castleview Hospital
300 North Hospital Drive
Price, Utah 84501
(435) 637-4800

May 27, 2010

Mr. Peter Crookston
PRO-774
Bureau of Reclamation
302 East 1860 South
Provo, Utah 84606-7317

Dear Mr. Crookston:

As the Chief Executive Officer of Castleview Hospital in Price, Utah, I am writing to express my sincere concern regarding the Gooseberry Dam project proposed by Sanpete County officials.

I am writing strictly from the perspective of the major healthcare provider of hospital services in a large two county area. So much of what healthcare providers afford patients is dependant upon sufficient water supplies. We certainly are not talking about watering lawns or producing crops, we are speaking of keeping patients alive.

71-1 Allow me to give just one example. On Castleview Hospital's campus, we have partnered with the University of Utah Hospital in providing a significant Dialysis Outpatient Clinic. Many people outside of the healthcare arena are unaware of the significant need for sufficient water supplies to treat just one dialysis patient. On a normal dialysis day at the clinic, they treat, on average, ten to fifteen patients per day. They are open 6 days per week. Any interruption of water supplies for this single treatment alone, would be catastrophic for the entire population of dialysis patients. Without ample water supplies, patients on dialysis would die, literally.

I entreat you to consider all the facts as decisions are being made about this new dam project. I do not envy your decision and wish you the very best as this project is debated. Please feel free to make contact with me, if you need any further assistance with statistics, etc.

Castleview Hospital certainly votes NO on this new dam and the catastrophic effects it could have on the water supply for patients and residents of Carbon & Emery counties.

Thank you for your valuable time reading my comments.

Most Sincerely,

Jeffrey J. Manley, CEO
Castleview Hospital

72. CASTLEVIEW HOSPITAL, MAX MORGAN, CASTLEVIEW HOSPITAL

06/01/2010 18:42 FAX 4356371581 MAX MORGAN ☑001

ORIGINAL COPY

FAX

MAX G. MORGAN M.D.
230 N. HOSPITAL DRIVE, SUITE #4
PRICE, UTAH 84501
PHONE: 435-637-2300 FAX: 435-637-1581

To: Peter Crookston
Fax #: 801-379-1159
Date: 6/1/10

From: MAX G MORGAN
Pages (Including Cover): 10
Re: Goose berry Creek

Enclosed are copies of medical letters generated by the Castleview Hospital Medical Staff in regards to Scofield & Gooseberry issues

As you can see Residents of Carbon County were very sick drinking bottom water from Scofield during the drought years

Max G Morgan

MAX G. MORGAN, M.D
590 EAST 1ST NORTH, #5
PRICE, UTAH 84501
TELEPHONE (801) 637-2800

June 21, 1994

Bureau of Reclamation
Regional Environmental Office
125 South State Street
P.O.Box 11568
Salt Lake City,UT 84147

RE: Gooseberry Project

Dear Sirs:

It is my understanding that an EIS is being prepared for the Gooseberry Project. I was unable to attend the local hearing on the comment date and I feel that I have comments and information that are crucial to full consideration of project impacts which will be unavailable without consideration of my letter.

I would like to take this opportunity to address the water issue of long standing concern existing between Carbon County and Sanpete County residents. The issue specifically involves the Gooseberry Water drainage into Upper Fish Creek and ultimately into Scofield Reservoir.

Before going any further, I would like to apologize for not attending the public hearing in Price concerning this issue. As a physician, my intention was to present some information from a medical perspective, but needless to say a medical emergency called me away.

As you are aware, the residents of Carbon County obtain their irrigation and culinary water from the Scofield Reservoir and from some mountain springs. However in 1992, during the midst of the drought, while on water rationing since April , most of the culinary water came from the bottom of the very low Scofield Reservoir. The reservoir was so low that later that fall, it was necessary to dredge a channel from the residual reservoir water to the outlet of the dam in order to allow more water out to supply the residents of Carbon County.

This highly concentrated bottom water is therefore the source of concern to this Carbon County Physician of twenty two years. My practice in 1992 can be characterized as a year where patients presented to the office with a high incidence of gastroenteritis, symptoms of abdominal cramping, nausea, vomiting and bloody diarrhea. Along with this, there appeared to be an increase in the number of patients with hepatitis.

Other physicians in Carbon County both in private practice setting and in the emergency room have voiced these same concerns during the 1992 drought year. A concentrated effort is in

place to document the statistical numbers of hospital admissions related to gastrointestinal disorders during that year in comparison to non drought years. The number of patient office visits related to gastrointestinal disorders will be much more difficult to document.

My conclusions would be that the increased number of cases of intestinal disorders were related to the consumption of this highly concentrated bottom water. Whether there were residual bacterial coloforms present in the treated water or whether it was necessary to superchlorinate the water to render it safe is unknown. There were numerous complaints of cloudy drinking water. "swamp-smelling" bathing and drinking water and at times water from the tap that tasted like Chlorox. Never the less. the quality of this water was affected by the drought conditions.

72-1 There does seem to be a correlation between low reservoir water levels and drought conditions and between low water levels and gastrointestinal disease in Carbon County. Diverting water away from Carbon County in the future will adversely impact the critical water levels we now have and can adversely impact the health of the residents of Carbon County. This is especially true in future drought years.

Thank you.

Sincerely,

M.G. Morgan, M.D.

MGM/bk

MAX G. MORGAN, M.D.
590 EAST 1ST NORTH, #5
PRICE, UTAH 84501
TELEPHONE (801) 637-2300

August 24, 1994

Dear Medical Staff Members,

I'm forwarding a copy of my letter to the Bureau of Reclamation to you. The intent of the letter is to let you know what is developing in regards to our future culinary water in Price.

I am soliciting information and request you send me a short letter or note indicating if you found a trend in Health Care Problems in the years 1989 to the present. Specifically I would like to focus on only Gastrointestinal Disorders (i.e. Hepatitis, Infectious Colitis, Gastroenteritis, etc.).

Please send your letter as soon as possible. Time is of the essence.

Sincerely,

Max G. Morgan M.D.

CASTLEVIEW HOSPITAL

September 6, 1994

Max G. Morgan, M.D.
590 East 100 North
Price, Utah 84501

Dear Dr. Morgan:

It's my understanding that there are some hearings going on regarding the quality of water in Carbon County and possible diversion of water from the Scofield drainage system.

Given the history of our recent drought situtations which have extended across the past five years and the quality of the water and the amount of rationing we have had to undergo suggests to me this is a very poor idea. It is also my impression that during these drought years there have been much higher than average numbers of gastrointestinal diseases, including what have often been diagnosed as viral gastroenteritis symptoms, Type A hepatitis, and also documented bacterial enteri disease.

Please voice my support of any efforts to defeat the bill which would divert any water from the Scofie d drainage system into other systems.

Sincerely,

Cameron S. Williams, M.D.

CSW:sam

300 N. Hospital Drive
Price, Utah 84501
Telephone: (801) 637-4800

Kurt V. King, M.D.
INTERNAL MEDICINE

280 NORTH HOSPITAL DRIVE, #3
PRICE, UTAH 84501.
Telephone (801) 637-7178

August 29, 1994

Dear Dr. Morgan:

I found your letter to the Bureau of Reclamation very interesting. I like you, don't have the computer necessary to tell me the diagnosis that brought people into my office. Never the less, It is my opinion that there was more gastrointestinal disorders during the last drought year.

As a water consumer, I also noticed that the water was cloudy at times, and smelled musty. I also noticed that it tasted bad.

I like you do not know the mechanism for the increased incidence of stomach problems during the drought. It could have been due to super-chlorination, or to the highly concentrated bottom water.

Sincerely,

Kurt King MD

P.S. I and my nurse were both concerned about the water to the point that both she and I used bottled water for our families.

Kurt.

CASTLEVIEW HOSPITAL

August 29, 1994

Max G. Morgan, M.D.
590 East 100 North, No. 5
Price, Utah 84501

Dear Dr. Morgan:

In regards to your letter to the Bureau of Reclamation, I have made an informal review of patients that I have seen in the emergency room in the past several years. I have noted a small increase in gastrointestinal disorders. This seems to have been an increase in hepatitis as well as infectious colitis and some gastroenteritis lately. This may be related to the water situation at Scofield. This is at least a concern of mine, and I am as well concerned about the drawing off of water by reservoir at its lower levels.

Please register my concerns with the Bureau of Reclamation.

Sincerely,

Arvid A. Carlson, M.D.

AAC:lb

300 N. Hospital Drive
Price, Utah 84501
Telephone: (801) 637-4800

KEVEN D. BROCKBANK, M.D.
590 East 100 North, #6
Price, Utah 84501
(801) 637-8220

August 30, 1994

Dear Dr. Morgan:

I recieved a copy of the letter that you sent to the Bureau of Reclamation concerning the Gooseberry Project. I remember very well severe drought that peaked in the summer of 1992. During that time I definately noticed a major increase of the patients with gastrointestinal complaints. Initially I thought that it was just an increase in the flu but the histories just were not quite right. My practice is not computerized so I am unable to effectively retrive the data to support my impressions. Knowing the depth of our water supply at Scofield Reservoir, I would consider it as a very possible source of the increase in GI illness.

Sincerely Keven Brockbank M.D.

CASTLEVIEW HOSPITAL

August 30, 1994

Bureau of Reclamation
Regional Environmental office
125 South State Street
P. O. Box 11568
Salt Lake City, Utah 84147

RE: culinary water in Carbon County area

Dear Sirs,

This letter is to further voice concerns being raised in this area regarding the decreased availability of adequate drinking water in the Carbon County area. Previous letters have been forwarded to you by other physicians, specifically Dr. M. G. Morgan. I have been a primary care physician in this area for the past eleven years and have watched water go from an over abundance in the early 1980's to frank scarcity throughout the latter 1980's and throughout the 1990's. The concern of the medical community in this area is fairly straight forward. A lack of potable water is clearly related to disease world wide. There is no exception. There is no reason this should not apply to our area as well.

This area clearly did have an increase in gastrointestinal disease including hepatitis. Specifically a large epidemic of hepatitis swept through the area in 1992. Other gastrointestinal diseases which are known to be water-borne also appear to have increased during that time frame.

There is no good statistical data to support the assumption promoted by Dr. Max Morgan; however, it is a reasonable consideration. Prior to diverting further precious drinking water out of the area for nonculinary purposes, this hypothesis certainly needs to be examined. I would appreciate greatly if you would at least give consideration to a study into this matter. If we are able to obtain adequate time to produce this study, it is possible we could enlist epidemiologists and professionals specifically trained to deal with such problems.

Your consideration of our concern and at least a proposed study would be greatly appreciated by the medical community of Carbon County.

Sincerely,

Glenn T. Etzel, M.D.

300 N. Hospital Drive
Price, Utah 84501
Telephone: (801) 637-4800

CASTLEVIEW HOSPITAL

August 30, 1994

TO WHOM IT MAY CONCERN:

I was asked by Dr. Max Morgan to express my views on water issues in regards to the Carbon and Emery County areas. I have practiced in this area for eleven years, doing family practice. My partner and I have seen nearly every resident of the two counties at one time or another over the last eleven years. During that time we have noticed a severe increase in gastro-testinal difficulties in draught years. It is obvious that bottom water out of our reservoirs is contaminated to a point that our patient population is at risk to become ill when exposed to this. It would be difficult to understand why any elected official would feel it necessary to divert water from our relatively densely populated area into a less populated area because of these health reasons.

I stand, therefore, against any diversion of reservoir water out of our area. I believe that if public funding is in excess and there is a question as how best to utilize the money, it might be reasonable to take a look at our highways which are considered death traps.

Sincerely,

Fred W. Feuerstein, M.D.

FWF/rs

300 N. Hospital Drive
Price, Utah 84501
Telephone: (801) 637-4800

An Affiliate of HealthTrust, Inc. - The Hospital Company

73. CENTRACOM, EDDIE L. COX, PRESIDENT

AL

ORIGINAL

PRO OFFICIAL FILE COPY
RECEIVED
MAY 20 '10

Reply Date		
Date	Initials	Code
5/20	BC	100
		105
		107
	RS	700
6/16/10	BCH	770
6/17/10	PC	7740

Action:
Classification: ENV - 6.00
Project: NARROWS
Control No: 10033423
I.D.: 1122816

May 19, 2010

Bureau of Reclamation
Attn. Peter Crookston, PRO-774
302 East 1860 South
Provo, Utah 84606

Re: Gooseberry Narrows Project

Dear Mr. Crookston:

73-1 I am writing in support of the proposed Narrows Dam & Reservoir.

As the President of CentraCom (a rural communications company serving Sanpete County), the Chairman of the Trustees at Snow College, a former Sanpete County Commissioner, and a rancher living in Fairview, I know of the desperate need for water storage in Sanpete County. While the history of lost opportunities, broken promises, and general record of this project have been lived by me and my family for at least three generations, I would prefer to focus on the present and future needs of this water for Sanpete County and the State of Utah.

Sanpete is growing county that will need water storage to sustain its growing population. Sanpete is a bedroom community for the Wasatch Front. All of the water that is used for municipal water systems presently come from wells and springs in the canyons. There is no storage facility for surface water in any of the communities in north/central Sanpete County from Fairview to Manti. Sanpete is the only county of any size that does not have the ability to store surface water. The new storage facility needs to be implemented to reduce on-going water shortages presently, and to prepare for continued growth in the future.

This project will have significant economic impact during the construction of the Narrows dam, but more importantly for 100+ year life of the facility. It is estimated that this will create at least one million dollars per year of economic benefit for Sanpete County. While the immediate impact for farming pursuits is sizeable, the future opportunities for light industry, community growth, and the "ripple affect" from the Narrows project as a reliable storage facility are immense. I believe that the general well being of the residences of Sanpete County will be improved. Economic well being fosters more people investing in education and the outlook for a positive future. The impact on public education, Snow College and other institutions will be favorable. The ability to keep our educated young people in Sanpete County will have a natural upward impact on people's earning ability. In turn this will foster more investment in the community and a better more secure future for the county and the people who call Sanpete home.

I recommend that the Bureau grant a perpetual easement for the construction, operation, and maintenance of the Narrows project, and that the loan for the construction of the Narrows be approved. This project is good for Utah and should be moved forward without delay.

Sincerely,

Eddie L. Cox
25290 N. 11500 E.
PO Box 219
Fairview, Utah 84629

74. EPHRAIM MINI STORAGE

ORIGINAL

May 25, 2010

Dear Mr. Crookston,

74-1 I am a life long resident of Sanpete County. A family member served on the water conservancy board for many years. He worked really hard on getting the Narrows Project to come to pass. There have been many points of view expressed on the project, but the bottom line is that it is our water and we need to have a way for it to be delivered to Sanpete County. There is no water storage available for the northern half of Sanpete County. If we could get the late water from the Narrows Project we could possibly grow a 3rd crop of alfalfa and we could utilize our pastures better because we would have water for our animals.

The people who years ago filed on that water knew how important it would be to our area. I feel that there would be many good benefits come from the Narrows Project. The dam would provide not only the water we need but would boost the local economy through recreation. Municipalities would also benefit from having this water for future growth.

It just seems that if this is our water, and there seems to be no dispute about that, we should be able to get the water. It's just wrong that Carbon County has been able to use our water all these years and has forced us to spend thousands of dollars to fight for something that should have been done 60 years ago.

If this is our water, I just don't understand why the Narrows Project is being debated at all. It's time to do the right thing and for politicians to stop pandering to Carbon County in the hopes of being re-elected. I think it's also a shame that for the price of a postage stamp, environmental groups can stop the work that decent, honest men have spent years working on.

I hope you will be fair in your decision because right is right and wrong is wrong. The right thing to do is to give Sanpete County a way to get the water that is our.

Sincerely,

EPHRAIM MINI STORAGE
320 WEST 100 NORTH
EPHRAIM, UT 84627

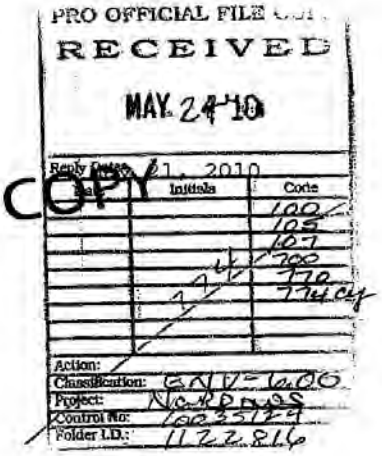
Reply Date

Date	Initials	Code
		100
		105
		107
	KS	700
6/16/10	BCM	770
6/21/10	PC	774 cy

Action:
Classification: ENV-6.00
Project: Narrows
Control No: 10037590
Folder I.D.: 1122816

75. FAIRVIEW LAND AND LIVESTOCK COMPANY, JACK MCALLISTER, PRESIDENT

ORIGINAL



COPY

NARROWS PROJECT

Peter Crookston, PRO-774
Bureau of Reclamation
302 East 1860 South
Provo, UT 84606-7317

SDEIS

COMMENTS

From:
Fairview Land and Livestock Co.

General Comments:

We have a sheep operation and own most of the private land underlying the proposed reservoir, subject to an easement in the Sanpete Water Conservation District (SWCD) to flood the property. We support the project and encourage prompt decisions, construction of the damn and development of the water.

Many agriculture operations, including ours, run out of water around July, and the flow becomes insufficient for the last months of Summer. This problem has gone on for several decades. Our urgent need for water in the north of Sanpete County remains desperate, and this project will be of great benefit for our area as well as downstream to the Sevier river and on to Delta.

We support the 17,000 acre feet alternative as the most efficient and cost effective manner of getting the water to where it is needed, and further benefiting additional agricultural operations and public entities down stream.

While some citizens of Carbon County are against the proposed project in any shape or size, they must recognize: 1) legal ownership of the water in question is settled in favor of the SWCD, 2) the equity of water usage isclearly in favor of the project since Carbon County residents have more than sufficient irrigation water and storage capacity, and will still have sufficient water to last their growing season, and 3)basic fairness should not allow political expediency to frustrate the project at the expense of the rightful water rights owner. Justice can only be served by honoring the water rights and allowing the project to go forward.

COMMENT: GRAZING ALLOTMENTS pages 3:88-90

75-1 In our operation we hold 2 of the 3 affected allotments. The proposed project would cause a loss of 856 acres (directly) and 1870 acres (indirectly). There should be some way to designate the acreage and quantify the percentage lost to each individual allotment. This project may reduce one or both allotments so as to become economically unfeasable to operate, thus causing some damage to the remaining portion.

COMMENT: CONSERVATION EASEMENTS Pages 2: 28-30

Conservation easements of 500 feet from the water line appear to prohibit livestock grazing or watering at the reservoir. On the face of it this easement would deprive us of the use of our entire property for agriculture purposes. Specific arrangements should be allowed with each individual land owner according to their respective needs, as part of the negotiation process. If grazing or watering is eliminated, there arises a concern for damage to the use and value of the remaining property, especially for agricultural purposes.

75-2 Because of this potentially extreme effect on our livestock operation, some consideration should be given to a land trade: the land needed for the project could be traded for sufficient adjacent forest land to compensate and replace the land needed for the project.

COMMENT: COTTONWOOD STREAM & PIPELINE Pages 3: 99-100

75-3 The pipeline will be constructed from the tunnel to a point 300 feet down stream from left hand fork, with a significant increase in stream flow. We are concerned with possible increased erosion and potential loss of an
75-4 access road down stream. To ensure that the increased flow will not impact channel stability, an automated remote device at the canyon mouth will signal a valve at the tunnel inlet which will automatically control releases.

There should be some assurance that the signal is reliable to pass through the mountain or otherwise actually and reliably reach the control valve seven or eight miles away. In the event the valve fails, who will monitor the stream flow? Who is to provide armoring materials if needed? And if we find damage, who do we contact for help?

Additionally, because the Cottonwood stream will be in a pipeline, consideration should also be given to improving the sight distance and parking area at the severe curve on Highway 31 near the outlet of the pipeline in Section23. This location is heavily used by snowboarders and vehicles during the winter recreation months. It should be possible to accomodate snowboarders with little additional expense to widen the highway for a small parking space. In past years accidents and even fatalities have occured on this particular curve. This improvement could be made when the pipeline is installed in the important interest of highway and recreational safety.

We appreciate the well considered SDEIS and the opportunity to comment on the project and how we believe it will impact our interests. We encourage a decision to go forward with all deliberate speed.

Jack McAllister

cc:
David Cox
SWCD

Jack McAllister President
Fairview Land & Livestock Co.
138 West 400 North
Mt. Pleasant, Utah 84647
(435) 462-2625

76. HARD HAT FURNITURE AND APPLIANCE, PAUL HOFFMAN, OWNER

ORIGINAL

May 28, 2010

Mr. Peter Crookston
PRO- 774
Bureau Of Reclamation
302 East 1860 South
Provo, Utah 84606-7317

Dear Mr. Crookston,

76-1 As a small business owner and resident of Carbon County, I am writing to express my concerns regarding the Gooseberry Dam Project proposed by Sanpete County Officials. This should be a cut and dried issue when the obvious factors are considered. Water supply to Carbon County is provided solely by Scofield Reservoir, therefore it is our lifeline. Without it, WE DIE !
Sanpete County would only produce a few more bales of hay with our precious water. It doesn't make any sense to jeopardize the lives of Carbon County residents, just to fulfill the greed of a few politicians.
I am urging you to do everything possible to shut this project down once and for all.

Thank you for your time and consideration.

Sincerely,

Paul Hoffman/ Owner
Hard Hat Furniture & Appliance

Hard Hat Furn. & Appl.
21 West Main St.
Price, UT 84501

PRO OFFICIAL FILE COPY
RECEIVED
JUN 0 1 '10

Reply Date Date	Initials	Code
		100
		105
		107
	ES	700
6/17/10	[illegible]	770
6/21/10	RK	774cy

Action:
Classification: ENV-6.00
NARROWS
100380 18
1122816

77. MADSEN CHIROPRACTIC, CHARLES HOWARD, OWNER

PRO OFFICIAL FILE COPY

RECEIVED

APR 23 '10

Reply Date		
Day	Initials	Code
5/3	DCB	100
	[illegible]	105
	KS	107
5/7/10	BCH	700
5/10/10	HC	770
		774 cy

Action:
Classification: ENV - 6.00
Project: NARROWS
Control No: 100-2787
ID: 1122916

Madsen Chiropractic

Fast, affordable, and effective pain relief

Charles A. Howard D.C.

DC: Western States Chiropractic College, Portland, OR
Licensed: State of Utah Department of Commerce Division of Occupational & Professional Licensing
Member: American Chiropractic Association

77-1

Effective relief of your pain...
- Back
- Neck
- Headaches
- Automobile accident injuries & whiplash
- Arthritis
- Shoulder & extremity
- Workers' Compensation
- Carpal tunnel syndrome

...today!
- No-Wait Guarantee
- Most major insurance plans accepted
- Flexible in-house financing available
- Open five days a week
- Lunchtime & evening appointments
- Emergencies seen promptly

Bureau of Reclamation
Attn: Peter Crookston, PRO-774
302 East 1860 South
Provo, UT 84606

Dear Sirs,

The purpose of this letter is to give my full-hearted support to the Narrows Project to provide the much needed and long delayed water storage for Sanpete County. There is no question that this will have more utility to this County than anything else that could be considered.

We have been promised this long ago. Please give us the Narrows Dam and Reservoir now! Thank you for your timely consideration.

Sincerely,

Charles A. Howard, D.C.
11475 E. 27000 N.
Fairview, UT 84629

435 South Main ▲ Ephraim, Utah 84627 ▲ **(435)283-4069** ▲ **Fax (435)283-0372**

78. MORONI FEED COMPANY, KENT BARTON, PRESIDENT

ORIGINAL

Crookston, Peter L

From: kbarton@norbest.com
Sent: Sunday, May 30, 2010 9:23 PM
To: PRO NarrowsEIS
Subject: Narrows Project

Dear Mr. Crookston -

78-1 I'm writing this letter to encourage your support for the completion of the Narrows Dam and Reservoir project for Sanpete County.

As president of the largest employer in Sanpete County I can tell you that there are a host of reasons for which the project makes sense including agricultural, economic, recreational, etc. But in the end, what it all comes down to is that Sanpete County has the legal right to the water in question and, the project has been approved on multiple occasions over many years.

Our economy in Sanpete is fragile, we rely heavily on the agriculture sector for which water is our life blood.

I think it's ironic that Carbon County opposes the project for among other reasons "environmental concerns" when they have been on the other side of that argument so frequently in the development of their vast and rich energy resources.

Sanpete has legal right to the water and the project has been approved. Please, let's move forward and get it completed.

Respectfullly,

Kent Barton
President
Moroni Feed Company / Norbest
Sent from my Verizon Wireless BlackBerry

OFFICIAL FILE COPY
RECEIVED
JUN 8 '10

100
105
107
700
770
774 cy
7/8/10
7/12/10

ENV-6.00
NARROWS
10045162
122816

79. MORONI FEED COMPANY, BRANDON P. OLSON, CHIEF FINANCIAL OFFICER AND VICE PRESIDENT

MORONI FEED CO.
"Progress Through Cooperation"

PRO OFFICIAL FILE COPY
RECEIVED
Moroni Feed Co.
MAY 24 '10

P.O. Box 368
15 East 1900 South (Feed Mill Road) Moroni, Utah 84646
435-436-8221 .Fax 435-436-8101

Reply Date		
Date	Initials	Code
		100
		105
		107
	KB	700
6/4/10	BM	770
6/21/10	PC	774cy

Action:
Classification: ENV-6.00
Project: NARROWS
Contract No: 10035078
PCD: 122816

May 20, 2010

Bureau of Reclamation,
Attn: Peter Crookston, PRO-774
302 East 1860 South
Provo, Utah 84606

Dear Bureau of Reclamation,

79-1 I am writing this letter as the Chief Financial Officer for Moroni Feed Company. Since 2007 three major events created the perfect storm and have negatively impacted Sanpete County, which the narrows project, if completed prior to 2007, would have brought balance to the county's disproportionate share of the negative economic effects.

Let me first provide a few facts. Moroni Feed Company formed as a farmer cooperative in January of 1938. Since that time we have become an "all-inclusive" turkey production cooperative and the largest employer in Sanpete County—until just recently. A study performed by the economics department of Utah State University in 2008 suggested that Moroni Feed Company represented approximately 11% of all employees in the county with approximately 14% of the total payroll.

In 2008, there were two segments of agriculture and the energy sector that saw records set. The protein industry saw input costs of grains go through the roof i.e. Corn went over $8.00 per bushel—the 15 year historical average for Moroni Feed Company had been $2.60 per bushel; the second segment of agriculture with records was field farming, where alfalfa crops received $210 per ton and as previously mentioned, grain farms received the highest prices ever for their crops; the energy sector bragged on wall street about record setting profits as fuel hit $4.79 per gallon. Coal also benefitted substantially.

A major factor impacting the corn market has been the energy policy, where government subsidies are provided for ethanol production. The average corn ethanol plant receives approximately $1.40 per bushel in subsidy at $0.50 per gallon of ethanol, where one bushel makes approximately 2.8 gallons. This has created a substantially unbalanced playing field for users of Corn—Turkeys rely on 60% of their diet and 60% of their cost

of production from corn and have to overcome $1.40 more cost per bushel than those that chose to turn corn into fuel—the subsidy has arbitrarily inflated the corn market.

The Narrows Project would have provided the balance through the only "Oil" Sanpete County has available to it. Our turkey producers that have field farms have always been able to balance poor turkey years with crop production. In 2008, Moroni Feed Company systematically laid off roughly 450 employees for a season while some balance returned to the grain commodity markets. The "cut your losses" approach still saw nearly $11,000,000 in losses which meant a change of over $17,000,000 from the prior year. While many of our turkey producers have field farms, the energy and feed costs were not overcome by crop production in 2008. However, if the Narrows project's considerable water storage would have been in place it would have meant millions more to our county in second and third crop alfalfa.

Instead, the largest employer had to cut production to reduce additional losses and cut employment, all the while Sanpete County's water flowed into the energy rich Carbon County. 2008 will most definitely go down in the record books for Sanpete and Carbon County—Sanpete lost substantially and Carbon benefitted substantially. Moving the water to the rightful owner would not have greatly impacted Carbon County negatively, yet it would have meant millions to Sanpete and brought some balance to the situation.

I urge you to move as swiftly as possible on this project. Allowing the project to be delayed any longer is not only not acceptable but nearly criminal. The studies have shown that the major concerns Carbon County is throwing at this project are either false or will be managed with proper oversight, engineering, and construction and are merely meant to delay as long as possible. Please help Sanpete County better weather the next "perfect storm" by providing us with OUR water.

Sincerely,

Brandon P. Olson, CPA
V. P. & Chief Financial Officer
Norbest & Moroni Feed Company
O: (435) 436-8221
F: (435) 436-8101
Email: brandon@norbest.com

80. PACIFICORP, CODY ALLRED, WATER RESOURCES ENGINEER

HL

ORIGINAL

PRO OFFICIAL FILE COPY
RECEIVED
JUN 01 '10

PACIFICORP ENERGY

Reply Date	Initials	Code
6/2		100
		105
		107
		700
6/16/10		770
6/21/10		774cy

Action:
Classification: ENV- 6.00
Project: NARROWS
Control No: 10037650
Folder ID: 1122816

May 28, 2010

Bureau of Reclamation
Attention: Peter Crookston, PRO-774
302 East 1860 South
Provo, UT 84606-7317

Re: ***PacifiCorp*** Comments to the Narrows Project – Supplemental Draft Environmental Impact Statement

Dear Mr. Crookston:

Please find below PacifiCorp's comments regarding the Narrows Project Supplemental Draft Environmental Impact Statement (SDEIS). Our comments start with an Introductory section followed by General Comments.

Introduction

PacifiCorp is a large, regulated western electric utility that serves approximately 1.6 million residential, commercial and industrial electric customers throughout its six state service territory. In Utah, we operate our retail electric service business under the name of Rocky Mountain Power and our electrical generating facilities under the name of PacifiCorp Energy. Our comments, however, will simply refer to PacifiCorp and not differentiate by business name.

PacifiCorp owns 6,400 gross megawatts of coal-fired generation company-wide in addition to other generating resources including hydroelectric, natural gas, geothermal and wind. We own approximately 15,000 miles of transmission lines, 40,000 miles of overhead distribution lines and 11,000 miles of underground distribution cable across the west. The 15,000 miles of transmission lines interconnect with other utilities in about 150 locations enabling PacifiCorp to buy and sell power with more than 60 other western utilities. This makes PacifiCorp a critical resource for supplying and moving power throughout the western states.

PacifiCorp Interest in the Narrows Project SDEIS – PacifiCorp is the owner and operator of the Carbon Power Plant, which is located in the Price River basin, near Helper, Utah. The plant can generate 175 megawatts from its regional coal and water supplies, which is about the amount of electricity needed to serve nearly 90,000 average sized homes. The Carbon Plant currently employees 69 people who are mostly residents of Carbon

and Emery counties. The Carbon Plant has an annual operating budget of 33 million dollars. Of this amount, about 19 million dollars is for the coal that is mined locally and is consumed by the plant to generate electricity.

The Carbon Plant has been in operation since the 1950's and has operated continuously since that time except for maintenance and unscheduled outages. On average, the Carbon Plant consumes approximately 2,100 acre-feet of water on an annual basis, which is nearly 700 million gallons per year. In some years, the plant has consumed nearly 3,000 acre-feet of water. Without an adequate water supply, the plant cannot operate continuously.

The Carbon Plant water supply consists of direct flow rights, groundwater wells, and storage water rights in Scofield Reservoir. Generally, these sources supply the necessary amount of water to meet the plant's needs. Typically, the Carbon Plant's Scofield Reservoir supply is held in reserve for use during the non-irrigation season (November through March). Releases from Scofield are made on demand during periods when natural flows are not sufficient to meet plant demand or when freezing conditions restrict river flows. During the droughts of the early 1960's and 1990's, Scofield Reservoir was drained to the dead storage pool, which caused the power company to take extraordinary measures to ensure continued operation of the Carbon Plant, including temporarily leasing water from local irrigators. This drought-year example is noted to demonstrate the role that Scofield Reservoir plays on the operation of the Carbon Plant, as well as to demonstrate the nature of empty reservoir conditions that are real – not hypothetical events.

General Comments

80-1 PacifiCorp offers the following general comments regarding the Narrows Project SDEIS:

1. The proposed Gooseberry Narrows Project significantly increases the potential for Scofield Reservoir to be drained to the bottom of its active storage. Figure 3-1, on Page 3-17 of the SDEIS, shows a comparison of the storage contents of Scofield Reservoir from the period of 1959 to 2003. This comparison shows that the frequency of Scofield going empty increases from 3 times in 43 years for the No Action Plan (which is the historical operation) to 12 times in 43 years with the Proposed Action. The possibility of having Scofield Reservoir empty one out of every 3-4 years causes PacifiCorp some concern.

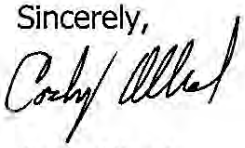
80-2 2. Although the future impacts of this project are unknown at this time, according to the data set in the SDEIS, it appears this project could have detrimental impacts on the Carbon Plant one out of every 3-4 years. This in turn, could result in PacifiCorp seeking replacement water and/or power from alternative sources, which would likely result in increased costs to our customers.

80-3 In summary, it is important to understand that PacifiCorp has valued customers in both Sanpete and Carbon Counties, as well as the rest of the State of Utah. Because the Carbon Plant supplies electricity to Sanpete County, Carbon County and many other areas throughout Utah (including the Wasatch Front), PacifiCorp believes that the interests of all its customers and rate payers are best served by the continuous and cost effective operation of the Carbon Plant.

Therefore, PacifiCorp's primary interest in these proceedings is to minimize the impact the Narrows Project may have on the Carbon Plant and on our customers. This means maintaining the ability to continuously operate the Carbon Plant by ensuring a reliable and cost-effective long-term water supply.

PacifiCorp appreciates the opportunity to submit these comments. Please contact Cody Allred at (435) 687-4306 with any questions or concerns.

Sincerely,



Cody Allred
PacifiCorp Energy - Water Resource Engineer

81. SACCO BROTHERS LAND AND LIVESTOCK, REX SACCO

AL

ORIGINAL

Crookston, Peter L

From: Rex L. Sacco [Rex.Sacco@carbon.utah.gov]
Sent: Tuesday, June 01, 2010 11:00 AM
To: PRO NarrowsEIS
Cc: Rex Sacco (saccos@emerytelcom.net)
Subject: S-B comments on Gooseberry 6_1_10.doc
Attachments: S-B comments on Gooseberry 6_1_10.doc

To whom it may concern,
Attached are comments from Sacco Brothers Land and Livestock, a Utah general partnership who is an affected interest in this proposed project. We hope that these comments will be used and considered appropriately in this NEPA process.

Thank you

Rex Sacco
General Partner/Agent
Sacco Brothers Land & Livestock
1655 W. 2100 N.
Helper, Utah 84526

PRO OFFICIAL FILE COPY
RECEIVED
JUN 10 '10

Reply Date	Initials	Code
		100
		105
		107
	KS	700
6/22/10	BCH	770
6/23/10	PC	7740

Action:
Classification: ENV-6.00
NARROWS
100416046
1122816

1

SACCO BROTHERS LAND & LVESTOCK
1655 W. 2100 N. Helper, Utah 84526
435-637-5001

May 31, 2010

Mr. Kerry Schwartz
Water and Environmental Resources Division
Manager, PRO-700
Bureau of Reclamation, Provo Area Office
302 East 1860 South
Provo, Utah 84606-7317
Telephone: (801) 379-1150
faxogram: (801) 379-1159
email: narrowseis@usbr.gov

Re: Comments on the Gooseberry Narrows Project Supplemental Draft Environmental Impact Statement (SDEIS); *Filing Number:* DES-09-55

Dr Mr. Schwartz,
Please accept the following comments for consideration before using Small Reclamation Projects Act (SRPA) funds to construct the proposed Gooseberry Reservoir. We expect the following comment to be made a part of the administrative record and used appropriately as governing laws and regulation allow to make a comprehensive determination prior to releasing any federal funding or allowing any federal property to be used to support this proposed project.

Substantive comments:

81-1 The costs of construction reflected in the supplemental draft (SD) are out dated.

81-2 Property values are underestimated.

81-3 The seismic standard evaluated for construction is below that mandated and implemented on the Scofield Reservoir leaving us to believe the level of protection is substandard and will leave every human, animal and ecosystem downstream in danger. It also doesn't reflect the true cost to perform this needed protection.
Taking away the Scofield shoreline property from existing residents to raise the shoreline level in case the Gooseberry Reservoir failed and then specifying a lower level of seismic protection would constitute a capricious and arbitrary action by the BOR and is subject to federal legal challenge.
The reservoir is too large for the amount of water that Sanpete would be allowed to take.
The surface areas of both reservoirs, (Scofield and Gooseberry) would be 32% larger, greatly increasing water loss due to evaporation.
Placing the subject reservoir in the proposed location; which is the highest precipitation water shed area in Emery, Carbon and Sanpete Counties (2,600 acres w/ a 60" + moisture average) is synonymous with painting a sponge, and will reduce the watershed output and water quantity for all the affected interests.

81-4 Road reconstruction costs are greatly underestimated. New design technology was not considered and could double the present construction costs leaving the estimated costs in the SD spurious as best.

81-5 Downstream impacts to existing water rights and wildlife especially aquatic wildlife are dangerously underestimated.
This is only a partial list of substantive comments that alone should create a question in the mind of anyone who is trained and knowledgeable of the impacts decisions of this nature could make as to the validity of funding this project.
We leave it to the bureau to consider whether it is realistic to believe that the SRPA program would provide sufficient funding to completely accomplish this project. The State of Utah can't help with this project. This year Utah estimated revenue shortfall of $685 million with a $100 million plus deficit. Next year is projected to be as bad or worse.

Procedural Comments:

Because every alternative supposedly made under the NEPA process never gave an opportunity for any affected interests input or consideration of their county plans and objectives; and were never offered involvement as cooperators as prescribed by Congressional law and Interior regulations and supported by the 10th Circuit Court Decision in Uintah County v. Norton and other legal decisions that further call for the federal agencies to allow local government's input and participation in these important matters to the local citizens of the area's most affected by any federally allowed actions, we vigorously protest the procedural nature of the building of this document as well as that of the original EIS that this document is supposed to supplement. We believe that this action allowed the omission of certain important facts that should have been viewed under the scrutiny of a NEPA analysis but was never brought to light in the interdisciplinary process thereby rendering this EIS inconclusive and arbitrary. We believe that if Carbon County were to challenge this action it would bring light to the exclusionary policy of the lead cooperators during the construction of the environmental analysis and reflect the need to begin this process all over again.

Sacco Brothers appreciates the opportunity to comment on this very important and life changing document. For the sake of many thousands of residents both present and future that live and own property and water rights downstream of the proposed project, consider the irreversible changed to our culture, lifestyle and economic stability that this proposed action will create.

Sincerely,

Sacco Brothers Land & Livestock
Rex Sacco, Partner/Agent

xc. Congressman Jim Matheson
Carbon County Commission
Carbon Water Conservancy Board
Senator David Hinkins
State Representative Christine Watkins
State Representative Patrick Painter

82. Sanpete County Broadcasting Company, Douglas L. Barton, President

Mid Utah Radio Mail - Support Narrows Project for Sanpete County Page 1 of 1

ORIGINAL

Mid-Utah Radio INCORPORATED

Doug Barton <dougb@midutahradio.com>

Support Narrows Project for Sanpete County

1 message

Doug Barton <dougb@midutahradio.com> Mon, May 31, 2010 at 3:21 PM
To: narrowsSDEIS@usbr.gov

5/31/10

COMMENT ON THE NARROWS ENVIRONMENTAL IMPACT STATEMENT... FOR SANPETE COUNTY.

82-1 I favor the creation of the Narrows Dam & Reservoir and encourage the Bureau of Reclamation to issue a favorable Record of Decision on the Project because Sanpete County's need for water storage is far more important than any environmental or other considerations weighing against the Narrows Project.

I am a life-long resident of Sanpete County and own and operate three radio stations in the county. I have been in business for over 35 years and probably understand the economic needs of Sanpete better than anyone else in this county. I was a farmer and livestockman prior to entering the radio broadcasting business in Sanpete.

I have followed this project all of my adult life and it is time for Sanpete to get the water and storage they were promised 70 years ago. The courts have upheld Sanpete's water rights to the project and so let's stop the delays and give Sanpete the water and storage we badly need. There is no reason for Carbon County to complain & attempt to delay and stop the project.... they received their legal water right 50 years ago and have the water storage to go with it. Sanpete has none.

Sanpete County must have the Narrows Project water and reservoir to preserve the county's agriculture industry. The ability to store water from the heavy spring run-off is critical. Sanpete County is also growing in population and this water storage will be critical for residential drinking water. The added recreational opportunities will be a real boost to the economy as will the construction jobs.

The positive effects of this Narrows Project for Sanpete County far out-weighs any negative environmental impacts that it may have, if any on the landscape. If Sanpete County had been allowed to construct the project years ago when it was first promised by the Federal Govt. and the Courts.... we would not be going through all this "Red Tape" and the associated legal and environmental study fees. The time is now.... so grant permission and let's move forward.

Thank You,

Douglas L. Barton
President ... Sanpte County Broadcasting Co.
KMTI/KLGL/KMGR/KMXD Radio Stations

Address: 390 West 500 North
Manti, Utah 84642
Cell Phone: 435-340-1075.
e-mail.... doug@kmtiradio.com

PRO OFFICIAL FILE COPY
RECEIVED
JUN 01 '10

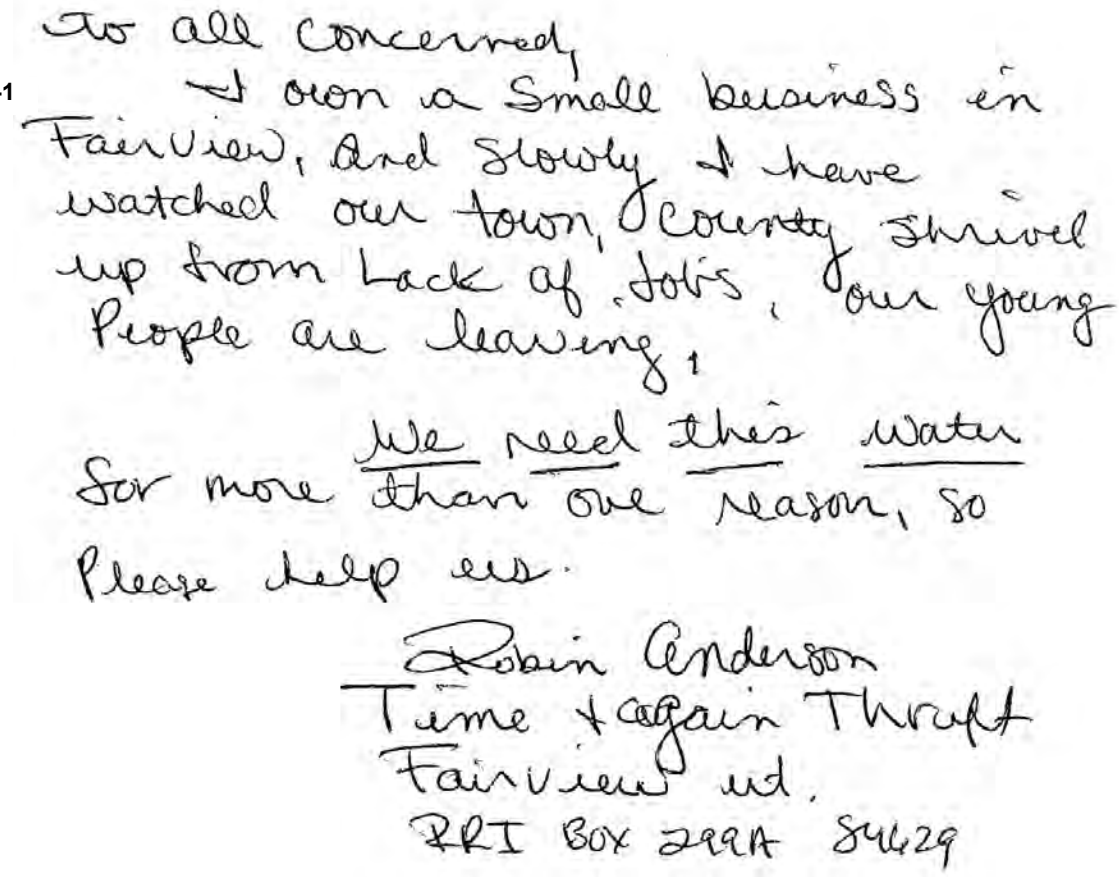
Reply Date

Date	Initials	Code
		100
		105
		107
	KS	700
6/16/10	BCH	770
6/21/10	PC	774 cy

Action:
Classification: ENV-6.00
Project: Narrows
Control No.: 10037674
Folder I.D.: 1122816

https://mail.google.com/a/midutahradio.com/?ui=2&ik=be7306af12&view=pt&search=sen... 5/31/2010

83. TIME & AGAIN THRIFT, ROBIN ANDERSON



To all Concerned,

83-1 I own a Small business in Fairview, And Slowly I have watched our town, County Shrivel up from Lack of Jobs, our young People are leaving.

We need this water for more than one reason, so Please help us.

Robin Anderson
Time + Again Thrift
Fairview rd.
RR1 Box 299A 84629