Appendix M

San Juan River Trout Fishery Monitoring Plan: Fish Health Assessment

FINAL REPORT

SAN JUAN RIVER TROUT FISHERY MONITORING PLAN: FISH HEALTH ASSESSMENT

NEW MEXICO COOPERATIVE FISH AND WILDLIFE RESEARCH UNIT

COOPERATORS:

New Mexico Department of Game and Fish
New Mexico State University
U.S. Geological Survey
Wildlife Management Institute
U.S. Fish and Wildlife Service

San Juan River Trout Fishery Monitoring Plan: Fish Health Assessment

Final Report to U.S. Bureau of Reclamation
Upper Colorado Region
Western Colorado Area Office

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EXECUTIVE SUMMARY

A Health Condition Profile (HCP) was conducted on rainbow trout (*Oncorhynchus mykiss*) in the San Juan River below Navajo Dam, northwestern New Mexico. The purpose of the HCP was to provide baseline data from which to assess the effect of the 4-month low-flow test conducted during the winter of 1996-97. Approximately 30 each of juvenile and adult fish were collected at two sites on each of five sample dates from October 2000 to August 2001. After lengths and weights were recorded, a necropsy-based fish health assessment was conducted. Blood was collected for hematocrit and protein analysis, and dorsal epaxial muscle was collected for lipid analysis. Data from the low-flow test (1996-97) and baseline study (2000-01) were analyzed to compare the health of fish population between the two sample collections.

Statistical comparisons of the data between the low-flow test and baseline study revealed relatively few significant differences. No relevant differences were observed in condition factor, normality index, severity index, feeding index, and HAI between 1996-97 and 2000-01. Although hematocrit was greater in 1996-97 than in 2000-01, all values were within normal ranges published for rainbow trout. In general, total protein levels were lower in 1996-97 than in 2000-01; however, the lower 1996-97 levels may be unrelated to the test because both sizes and sites were significantly lower in October 1996 (before the low flow began) than in October 2000. Percent muscle lipid showed no trend among size classes or sites within either sample collection. The low mesentery fat reserves and percent muscle lipids observed in adults in October 2000 are unexplained, but may be due to a disruption in the food source.

We conclude the health of the rainbow trout population did not appear to be negatively impacted by the 1996-97 low-flow test. However, potential chronic effects of extended low flows cannot be adequately assessed from the data collected in 1996-97 and in 2000-01. Based on the results presented in this report, a 4-month low-flow test and a one-year baseline study do not provide sufficient data to fully interpret the impact of multiple variables (both inherent and anthropogenic) on fish health. We recommend implementation of a multi-year baseline study in conjunction with monitoring future low flows to further assess seasonal versus low-flow effects on the long-term health of the rainbow trout population in the San Juan River.

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INTRODUCTION

The tailwaters of Navajo Dam on the San Juan River in northwest New Mexico contain a world-class rainbow trout (*Oncorhynchus mykiss*) fishery. In addition, the San Juan River is home to the endangered Colorado pikeminnow (*Ptchocheilus lucius*) and the razorback sucker (*Xyrauchen texanus*). A reduction in winter flow releases from Navajo Dam was proposed by the San Juan River Basin Recovery Implementation Program (Holden 1999) to investigate responses of the native fish populations to manipulations of the river's flow regime (USFWS 1996). The altered flow regime was designed to mimic the historic hydrograph for the endangered fishes. Winter releases are also reduced to store sufficient water for high flows in spring, as well as to meet current and future downstream water needs. To determine the effects of long-term reduced release of Navajo Dam, a 4-month winter low-flow test was conducted October 1996 through March 1997, in which the flow was reduced from approximately 600 cfs (cubic feet per second) to about 300 cfs with a minimum release of 250 cfs. The purpose of the 1996-97 investigation was to evaluate effects of the reduced flow on the trout fishery within the tailwaters of Navajo Dam. Specific objectives of the monitoring plan provided in a report by U.S. Bureau of Reclamation (USBOR 1998) were to determine if the reduced flow resulted in chronic stress as measured by a Health Condition Profile (Goede 1993), and physiological changes in the rainbow trout population. The results of the health condition profile in 1996-97 were inconclusive and indicated the effects of reduced flow on the health of the fish population may have been confounded by seasonal changes in food resources and metabolic demands (Sutton et al. 1999).

As a result, an additional study was conducted from October 2000 through March 2001 in which the health and condition of the fish population was monitored, but without the reduced flow. A sampling date in August was included to complete a full-year study period for the analysis of seasonal effects on the condition of the fish population. Reported are analyses of the results from the 2000-01 fish health condition profile and physiological indices of metabolic responses and a comparison of those results to the 1996-97 data.

METHODS

Sample Sites and Collections

Two sites representative of distinctly different flow regimes and aquatic habitat within the quality trout fishery were selected. The upper site (site 1; approximately 2.1 km long) was between Navajo Dam and Texas Hole, and the lower site (site 2; approximately 4.3 km long) was between Texas Hole and the end of the special regulation water. Site 1 was characterized by shallow depth (1-2 m), narrow river margin (20-30 m), frequent intermittent riffle areas and few pools. In contrast, site 2 was deeper (2-6 m) having wider river margins (30-50 m), infrequent riffle areas and frequent pools. Approximately 30 each of juvenile (155.7 - 197.2 mm) and adult fish (414.4 - 441.1 mm) were collected at each site on each of five sample dates from October 2000 to August 2001.

Fish were collected using an electrofishing boat equipped with a 220-V Smith-Root unit on 24-25 October 2000, 7-8 December 2000, 30-31 January 2001, 12-13 March 2001, and 28-29 August 2001. Immediately upon collection, fish were anesthetized in a buffered solution of Finquel™ (200 mg/L Finquel™:200 mg/L $NaCO_3$), and whole blood was collected from the hemal arch at the base of the caudal peduncle using a heparinized 3-cc syringe and a 21-gauge needle. Two hematocrit tubes were filled with whole blood and centrifuged (1,500 x g, 5 min) using a hematocrit centrifuge. The remaining whole blood was immediately placed on ice and centrifuged (5,000 x g, 10 min) within 8 h to obtain plasma for total protein analysis. After centrifugation, the plasma was removed and frozen until analysis for total protein within 2 weeks.

Health Condition Profile

After lengths (mm) and weights (g) were recorded, a necropsy-based fish health assessment was conducted. The method evaluates the whole organ appearance and provides a suite of indices including normality, degree of severity, feeding, and condition factor (Goede 1993; see Appendix A *Summary of Necropsies and Fish Necropsies Data Sheets*). A modification of this method was performed that substitutes numerical values for abnormal ratings and provides a quantitative health assessment index (HAI) for each fish that can be compared statistically (Adams et al. 1993). After the necropsy, approximately 2 grams of dorsal epaxial muscle were removed for analysis of percent muscle lipids and placed in a cryovial. The muscle samples were frozen until analysis within 8 weeks.

Physiological Indices

Changes in protein content were analyzed similar to that reported in the 1996-97 winter flow test (USBOR 1998; see Appendix B *Total Protein Methods*). For every 35 samples analyzed for total protein, a standard curve (serial dilutions of a standard reference- see Methods in Appendix B), a certified reference obtained from Sigma Chemical Co., and pooled fish serum (*O. mykiss)* were included in each assay. An assay was considered acceptable if all three of the following criteria were observed: (1) the linearity of the standard curve was $r^2 = 0.97$ or greater; (2) the reference was within the certified range listed by the manufacturer (5.3 - 6.7 g/dL; $\overline{X}$ = 6.0 g/dL); and (3) the intra- and inter-assay coefficient of variation ({standard deviation ÷ mean}x100) were $\leq$ 10% (see Appendix B *Quality Assurance - Quality Control*). The inter-assay coefficient of variation was 2.6% for the certified reference (n = 13) and the intra-assay coefficient of variation ranged from 0.035 to 7.15 % (n = 12) .

The procedure to determine total lipid content (percent wet weight) in muscle was determined gravimetrically following extraction and evaporation of methylene chloride (see Appendix C *Percent Muscle Lipid Extraction*). The method was slightly modified from the version developed for muscle lipid extraction of the 1996-97 Winter Flow Test (USBOR 1998) to include percent moisture.

Statistical Analysis

Statistical analysis was performed using SAS (SAS, 1999) with a probability level of α = 0.05 applied to all analyses. Data from 2000-01 were analyzed initially without the August sampling period for statistical comparison with 1996-97. Differences between months (October, December, January, March) for condition factor, total protein, and percent muscle lipid were analyzed by analysis of variance in adult and juvenile fish at each site (site 1, site 2). Residuals were graphically displayed on a probability plot and tested for normality using the Shapiro-Wilk test. If assumptions of normality were not met, the data were log transformed. A multivariate analysis (MANOVA) was then performed with condition factor, total protein, and muscle lipid as the dependent variables and month as the independent variable. Where the MANOVA results indicated a significant difference among means, Bonferroni multiple comparison test was applied. HAI data were rank transformed, analyzed by analysis of variance, and significant differences observed between months were tested with Tukey's Studentized Range Test. The same tests were applied to the 2000-01 data with the August sampling period included for within-year comparisons.

To compare October through March, 1996-97 and October through March, 2000-01 data, differences between given months were analyzed using MANOVA in adult and juvenile fish at site 1 and 2 with condition factor, total protein, and muscle lipid as the dependent variables and year as the independent variable. Where significant differences were indicated, Tukey's Test was performed on each variable. HAI data were subjected to the Wilcoxon rank sum method to determine differences between comparable months of both collection periods. Normality, severity, and feeding indices and hematocrits were compared between collection periods across all months using t-tests. Data are presented as arithmetic means and standard error (non-transformed) for each of the variables.

RESULTS AND DISCUSSION

Fish Health Assessment: October to March 2000-01

Health Condition Profile

Throughout the study, mean lengths of adult rainbow trout in site 1 ranged from 431.8 to 437.5 mm and juvenile fish ranged from 169.7 to 197.2 mm (Table 1). Mean lengths of adults from site 2 ranged from 415.0 to 439.6 mm and juveniles ranged from 166.9 to 182.7 mm (Table 2). The sex ratios were slightly skewed with a greater percentage of adults identified as females from sites 1 and 2 in October (67%, 73%), December (70%, 57%), and January (80%, 57%). Of these fish, from 46 to 86% were observed gravid or in post-spawning condition.
Although the percentage of adult female fish was lower in March for both sites 1 and 2 (47%, 47%), over 50% of the fish were gravid or in post-spawning condition (Appendix A).

Table 1. Comparison of 1996-97 and 2000-01 results from the fish health condition profile on rainbow trout in the San Juan River tailwater between Navajo Dam and Texas Hole (site 1). Means are presented for length, condition factor and hematocrit with minimum and maximum in parenthesis.

	Sample Size	Length (mm)	Condition Factor	Hematocrit (%)	Normality Index (%)	Severity Index	Feeding Index
Adult Fish:							
October 1996	24	397.4 (310, 460)	1.17 (0.93, 1.54)	47 (35, 58)	85.4	0.0	76.4
October 2000	30	437.4 (385, 500)	1.07 (0.73, 1.39)	34 (10, 50)	76.3	6.3	72.2
December 1996	30	418.4 (350, 470)	1.09 (0.92, 1.36)	-	76.0	3.3	64.4
December 2000	30	433.7 (365, 491)	1.09 (0.95, 1.31)	41 (18, 68)	71.3	12.1	61.1
February 1997	30	410.6 (351, 462)	1.06 (0.73, 1.31)	46 (27, 56)	83.3	7.1	83.3
January 2001	30	437.5 (358, 485)	1.01 (0.77, 1.20)	38 (25, 54)	81.3	5.1	59.5
March 1997	30	410.0 (350, 466)	1.07 (0.65, 1.31)	46 (32, 59)	79.7	12.5	87.8
March 2001	30	431.8 (343, 488)	1.00 (0.69, 1.35)	34 (10, 49)	80.3	4.6	86.7
August 2001	30	414.4 (310, 480)	1.16 (0.84, 1.68)	45 (25, 68)	77.0	10.0	60.0
Juvenile Fish:							
October 1996	28	186.1 (156, 248)	1.18 (0.96, 1.55)	53 (38, 72)	92.9	0.0	90.5
October 2000	21	169.7 (138, 226)	1.18 (0.95, 1.47)	48 (37, 63)	91.9	7.1	74.6
December 1996	30	178.3 (117, 225)	1.05 (0.72, 1.31)	-	95.3	2.5	70.0
December 2000	30	170.2 (131, 220)	1.15 (0.95, 1.38)	41 (29, 51)	87.7	10.0	67.8
February 1997	30	200.7 (159, 241)	0.99 (0.87, 1.13)	51 (46, 57)	91.7	3.8	70.0
January 2001	30	192.5 (146, 239)	1.09 (0.84, 1.40)	41 (31, 54)	92.3	7.1	73.3
March 1997	30	177.2 (110, 239)	0.98 (0.83, 1.34)	50 (38, 66)	84.3	10.4	70.0
March 2001	17	197.2 (132, 258)	1.06 (0.91, 1.19)	36 (19, 47)	88.2	9.6	82.4
August 2001	30	155.7 (120, 205)	1.21 (0.89, 1.50)	43 (28, 55)	88.3	11.7	90.0

- Data missing

Table 2. Comparisons of 1996-97 and 2000-01 results from the fish health condition profile on rainbow trout in the San Juan River tailwater between Texas Hole and the end of the special regulation water (site 2). Means are presented for length, condition factor, and hematocrit with minimum and maximum in parenthesis.

	Sample Size	Length (mm)	Condition Factor	Hematocrit (%)	Normality Index (%)	Severity Index	Feeding Index
Adult Fish:							
October 1996	30	415.5 (309, 480)	1.14 (0.89, 1.44)	46 (32, 56)	80.7	4.6	64.4
October 2000	30	438.6 (389, 475)	1.08 (0.63, 1.36)	44 (7, 69)	77.0	7.1	72.2
December 1996	30	410.8 (358, 464)	1.09 (0.79, 1.36)	42 (22, 61)	81.0	6.3	62.2
December 2000	30	439.4 (378, 525)	1.08 (0.80, 1.28)	38 (24, 50)	78.0	7.9	81.1
February 1997	30	400.2 (347, 442)	1.05 (0.87, 1.34)	43 (33, 54)	83.7	6.3	66.7
January 2001	30	415.0 (359, 495)	1.11 (0.89, 1.30)	40 (28, 53)	86.3	4.7	72.2
March 1997	30	393.8 (343, 446)	1.01 (0.82, 1.17)	49 (38, 57)	74.0	14.6	71.1
March 2001	30	427.1 (375, 475)	1.02 (0.80, 1.23)	39 (15, 49)	76.7	6.3	72.2
August 2001	30	441.1 (400, 485)	1.09 (0.70, 1.34)	41 (15, 58)	79.3	4.17	84.4
Juvenile Fish:							
October 1996	15	219.7 (155, 257)	1.10 (0.96, 1.26)	51 (43, 65)	92.0	0.8	77.8
October 2000	23	176.2 (122, 289)	1.17 (0.37, 1.40)	43 (33, 60)	90.4	8.2	71.0
December 1996	30	165.4 (131, 212)	1.07 (0.89, 1.33)	52 (42, 68)	86.7	7.9	66.7
December 2000	26	166.9 (120, 243)	1.16 (0.93, 1.48)	40 (21, 61)	90.4	8.7	84.6
February 1997	30	185.0 (130, 226)	0.91 (0.76, 1.37)	50 (33, 61)	83.0	10.4	71.1
January 2001	30	175.8 (125, 260)	1.04 (0.84, 1.18)	38 (29, 52)	93.3	5.0	73.3
March 1997	30	181.9 (123, 224)	0.93 (0.73, 1.08)	51 (34, 66)	88.3	8.8	60.0
March 2001	28	182.7 (122, 228)	0.99 (0.83, 1.16)	41 (29, 53)	90.7	7.6	77.4
August 2001	30	176.7 (130, 230)	1.21 (0.98, 1.59)	43 (33, 54)	89.0	13.3	98.9

A decline in condition factors from October to March, believed to reflect seasonal effects, was observed for both adult and juvenile fish. The decreases observed in adults (6.5% at site 1, 5.6% at site 2) were not significant (Figure 1A). However, the 10.2% and 15.4% declines in juveniles at sites 1 and 2, respectively, were significant (Figure 1B).

A series of indices (normality, severity, and feeding) have been developed from the Health Condition Profile. The normality index reflects the percent normal ratings assigned to: eyes, gills, pseudobranchs, kidney, thymus, spleen, hindgut, liver, fins, and opercles. In general, the higher the normality index, the healthier the population. Although no general trend was observed in adults or juveniles at either site, average values for the index at sites 1 and 2 were greater in juveniles (90%, 91.2%) than adults (77.3%, 79.5%) (Tables 1 and 2). An acceptable range for normality index (with 100% being normal or indicative of a healthy population) is 90-100% (Goede 1993). This criterion indicates that the juvenile fish are within the accepted or normal range while the adult fish are below the acceptable range. The lower normality index for the adults at both sites was influenced by the predominance of abnormal ratings for clubbed and marginate gills, swollen pseudobranchs, and blindness due to cataracts.

The severity index is computed from ratings or level of severity of thymus, hindgut, fin and opercles. The higher the index, the greater the level of severity combined in the four variables. An acceptable range for severity index (with 0% being normal or indicative of a healthy population) is 0-10% (Goede 1993). The severity index increased sharply (from 6.3% in October to 12.1% in December) in adult fish at site 1 and subsequently decreased to 5.1% in January (Table 1). The main contributing factor to the increase was fin erosion which may be explained by increased spawning activity due to a higher percentage of sexually mature adults observed in December (60% at site 1 and 53% at site 2). Except for the increase in adults in December, severity indices fluctuated but remained at or below 10% in both size classes at both sites throughout the study (Tables 1 and 2).

The feeding index is based on the fullness and color of bile in the gallbladder at the time of necropsy and provides an excellent indicator of time to last feeding. The higher the feeding index, the greater the feeding activity. An acceptable range for feeding index (with 100% being indicative of active feeding) is greater than 67% (Goede 1993). The index varied for both adults

2000-01 Condition Factor

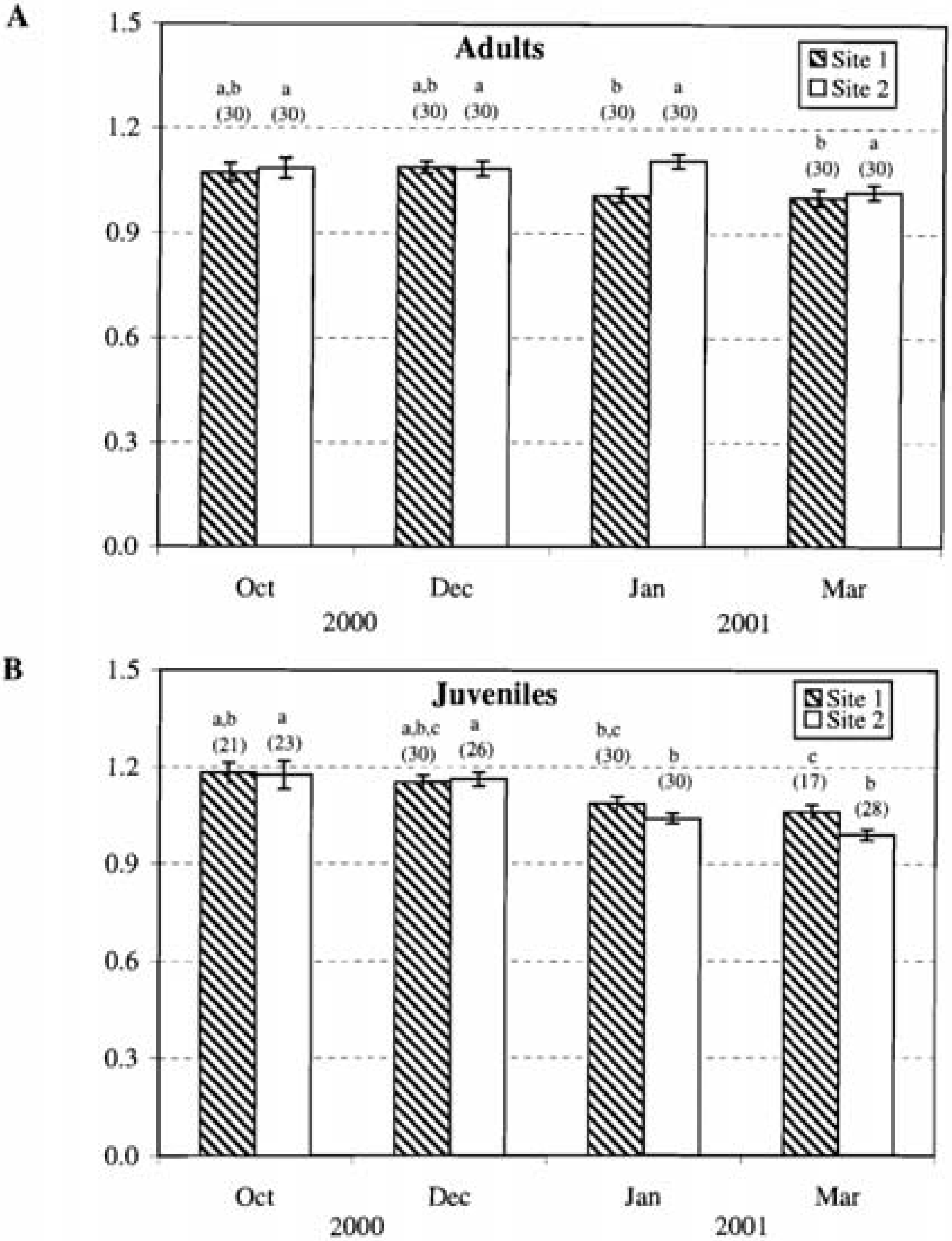

Figure 1. Mean 2000-01condition factor of adult (**A**) and juvenile (**B**) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

and juveniles throughout the study at both sites (Tables 1 and 2). In general, average feeding indices were slightly lower in adults at site 1 (69.9%) and site 2 (74.4%) compared to juveniles at sites 1 (74.5%) and 2 (76.6%). Except for adults at site 1 when the index decreased to 61.1% in December and 59.5% in January, both size classes at both sites were within the acceptable range for a population with adequate resources.

The Health Assessment Index (HAI) is calculated by assigning a numerical rating to the values given in the Health Condition Profile to the pseudobranchs, thymus, eyes, gills, spleen, hindgut, kidney, liver, opercles, and fins (Adams et al. 1993). A rating of 0 is given for normal values, 10 for mild abnormalities, 20 for moderate, and 30 for severe. The ratings are summed for each fish and then the means are calculated for each group. The higher the index, the greater the level of abnormalities within that group. Adult fish exhibited higher HAI indices than juveniles at both sites (Figures 2A and B) due to higher levels of abnormalities in the eyes, gills, pseudobranchs, thymus, kidneys, and fins. No significant difference was detected among the months for adults except in January when a decline in the ratings (or improvement in health) was observed at both sites in the pseudobranchs, kidneys, and fins (site 1 $P = 0.088$, site 2 $P = 0.012$). Juveniles also exhibited a decline in January, although not significant, due to an improvement in pseudobranchs and thymus.

Physiological Indices

Hematocrit reflects the percent red blood cells to total blood volume and is evaluated in the Health Condition Profile as a broad indicator of population health. It is assumed that elevated levels of hematocrit may represent a population under stress while low levels indicate the presence of disease (Goede and Barton 1990). There was no general trend in hematocrit for adults at both sites or juveniles at site 2, and even though juveniles at site 1 experienced a 25% decrease from October to March, both sites and size classes were within normal ranges for rainbow trout (34-57%, Denton and Yousef 1975; 22-44%, Miller et al. 1983) (Tables 1 and 2).

Changes in total plasma protein concentrations are considered a measure of sustainable growth (Brett and Groves 1979). Adults and juveniles at site 1 exhibited significant decreases (22.4% and 21.4%, respectively) in protein concentrations from October to March (Figures 3A

2000-01 Health Assessment Index

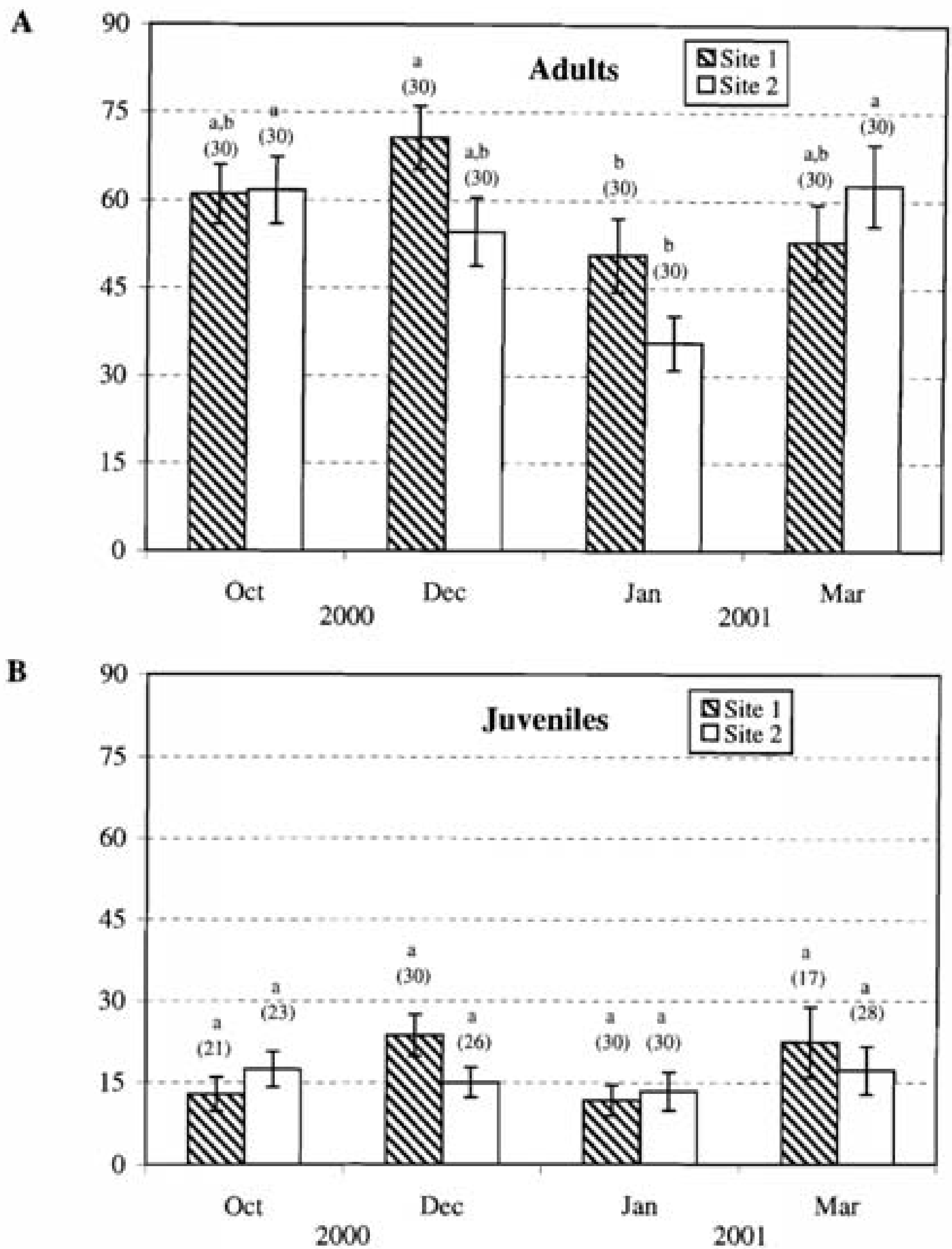

Figure 2. Mean 2000-01 health assessment index of adult (A) and juvenile (B) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

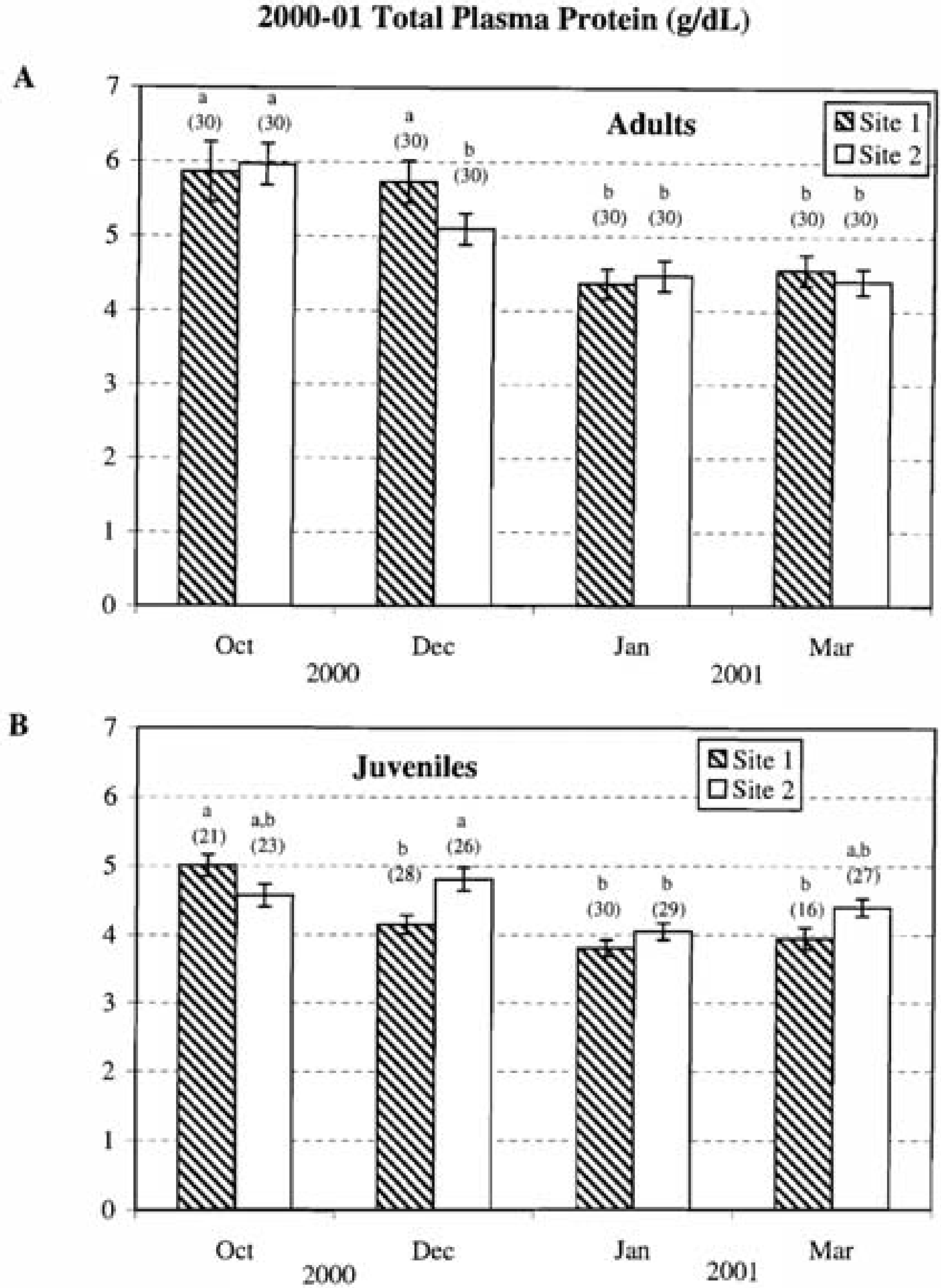

Figure 3. Mean 2000-01 total plasma protein (g/dL) in adult (**A**) and juvenile (**B**) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

and B). Adults at site 2 also experienced a significant decrease (26.3%), however, juvenile protein concentrations were varied and decreased by only 3.7% (Figures 3A and B). In both mature and immature salmonids from Canadian streams, Cunjak (1988) observed decreases in plasma protein levels from peak concentrations in summer to the lowest at the end of winter. Thus, decreases in total protein concentrations observed in this study may reflect seasonal changes.

Lipids are an important source of potential chemical energy, and their presence or absence reflects the performance capacity of fish. No general trend in muscle lipids was observed for adults at site 1 or 2 throughout the study (Figure 4A). In contrast, juveniles in October at both sites had twice the lipid levels of adults but experienced a significant decrease from October to December of 51.5% at site 1 and 61.9% at site 2 (Figure 4B). Muscle lipids in both size groups at both sites increased slightly in January possibly reflecting an increase in food resources.

Comparative Fish Health Assessments: October to March 1996-97 and 2000-01

Health Condition Profile

Condition factors decreased significantly from October 1996 to March 1997 in both size classes and at both sites ($P = 0.06$ for adults at site 1) (Figures 5A and B). Condition factors also decreased in 2000-01 in both size classes and at both sites; however, only juveniles exhibited a statistically significant decrease (Figures 1A and B). Juveniles had consistently higher condition factors in 2000-01 than 1996-97 with significant differences in all months at both sites except October at both sites and March at site 2 (Figure 6B). In contrast, condition factors in adults in 1996-97 generally were greater than or equal to 2000-01 condition factors (Figures 7A and B); however, only adults at site 1 in October 1996 had a significantly higher condition factor. The decrease from October to March seen across both sites and size classes in both collection periods appears biologically relevant with respect to changes in seasonal energy requirements. This overwinter loss in condition has been reported in other populations of salmonids, including rainbow trout in the Glen Canyon Dam tailwater (Valdez and Ryel 1995). Also, Cunjak and Power (1987) observed a decline in condition factor in salmonids from late summer through

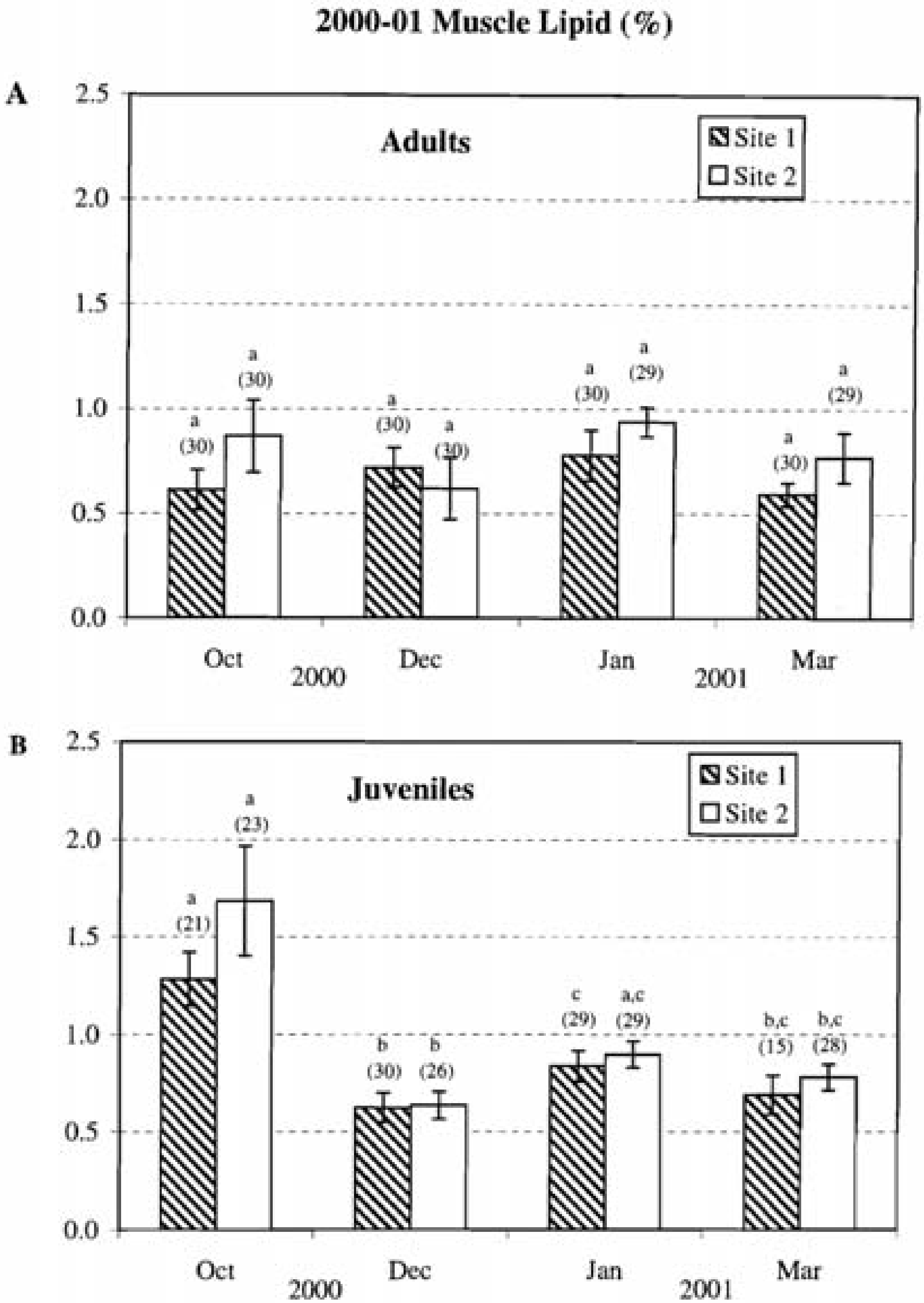

Figure 4. Mean 2000-01 percent muscle lipid (wet weight) in adult (A) and juvenile (B) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

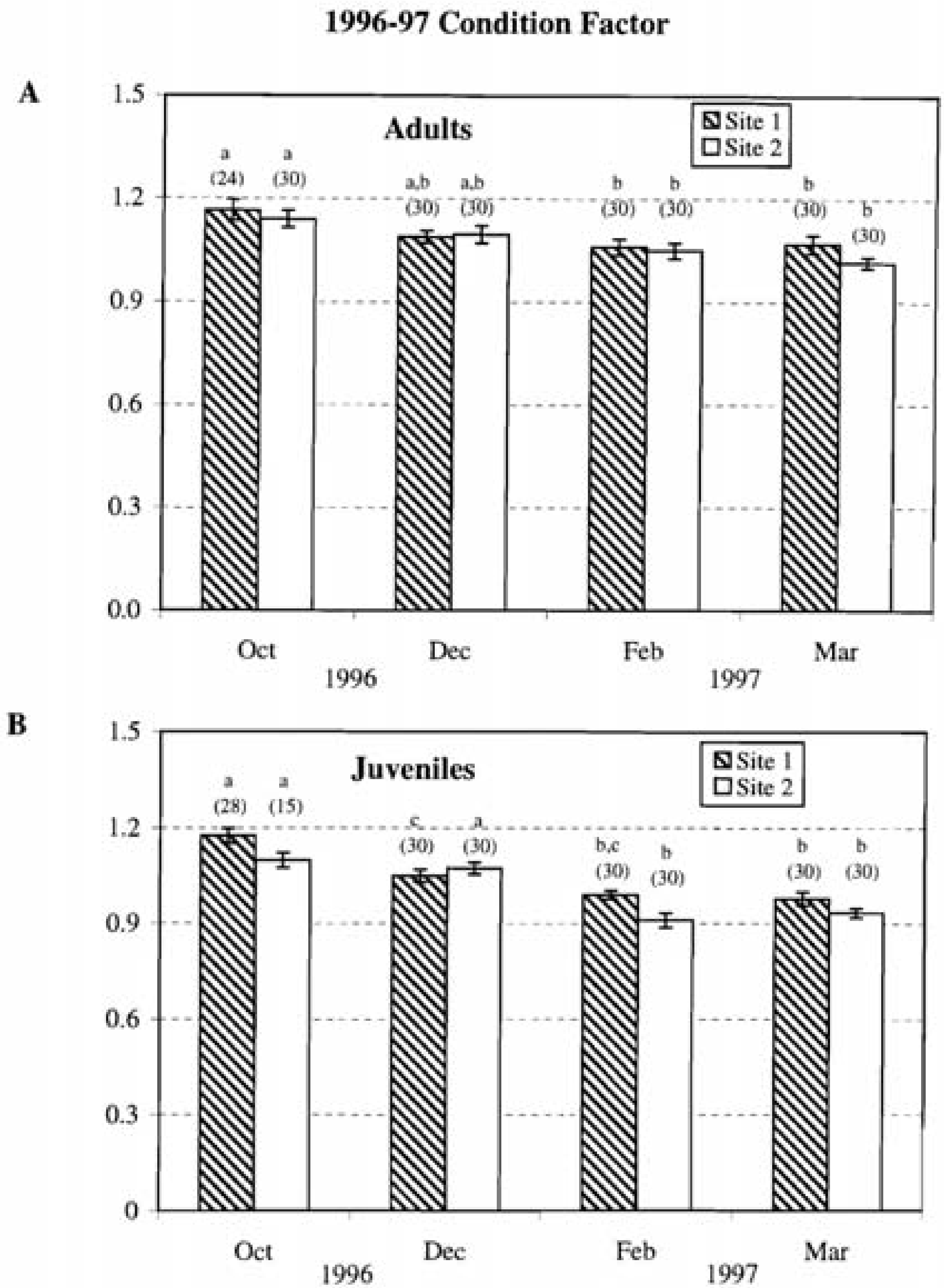

Figure 5. Mean 1996-97condition factor of adult (A) and juvenile (B) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

Comparison of 1996-97 and 2000-01
Condition Factor of Juveniles

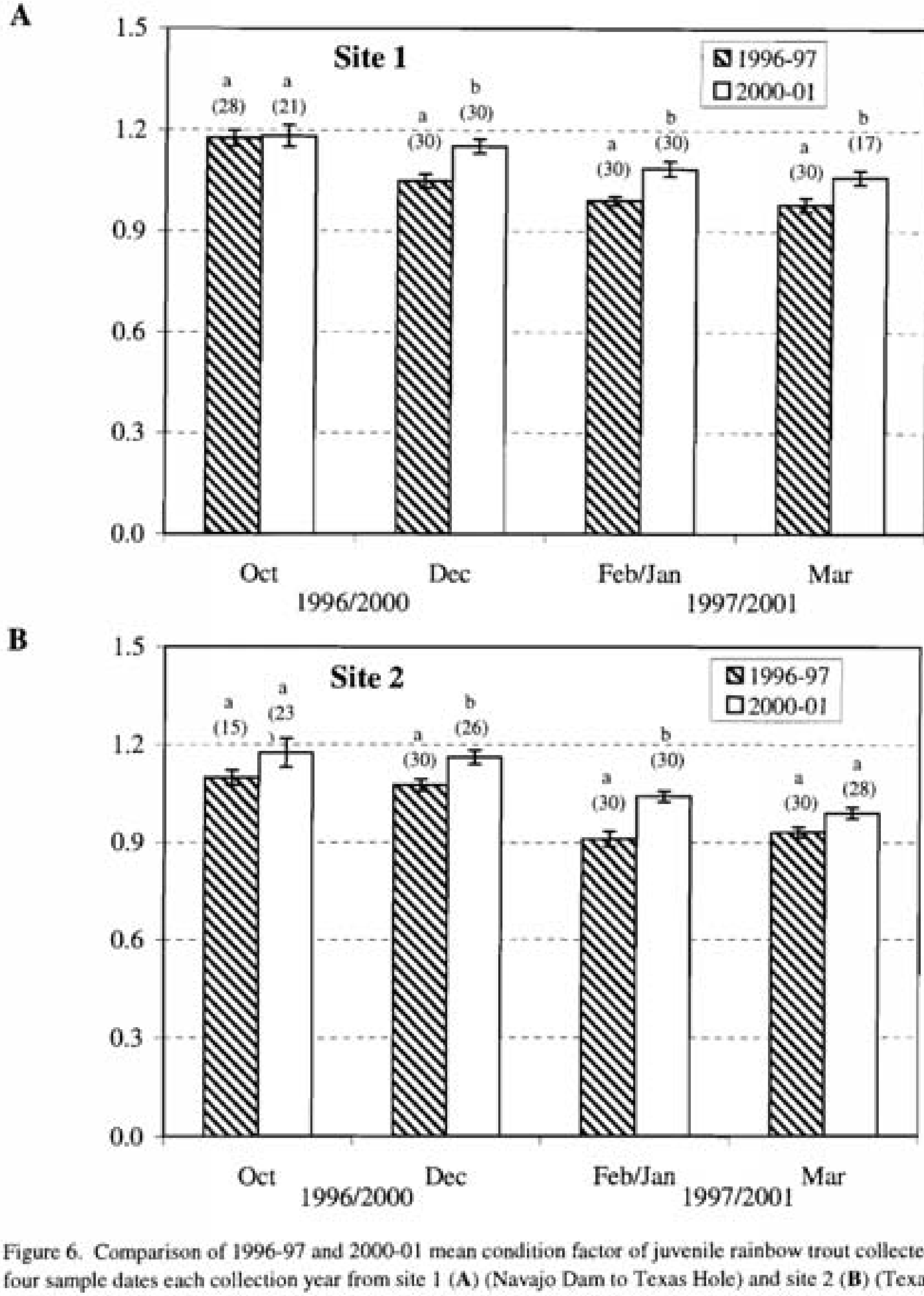

Figure 6. Comparison of 1996-97 and 2000-01 mean condition factor of juvenile rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

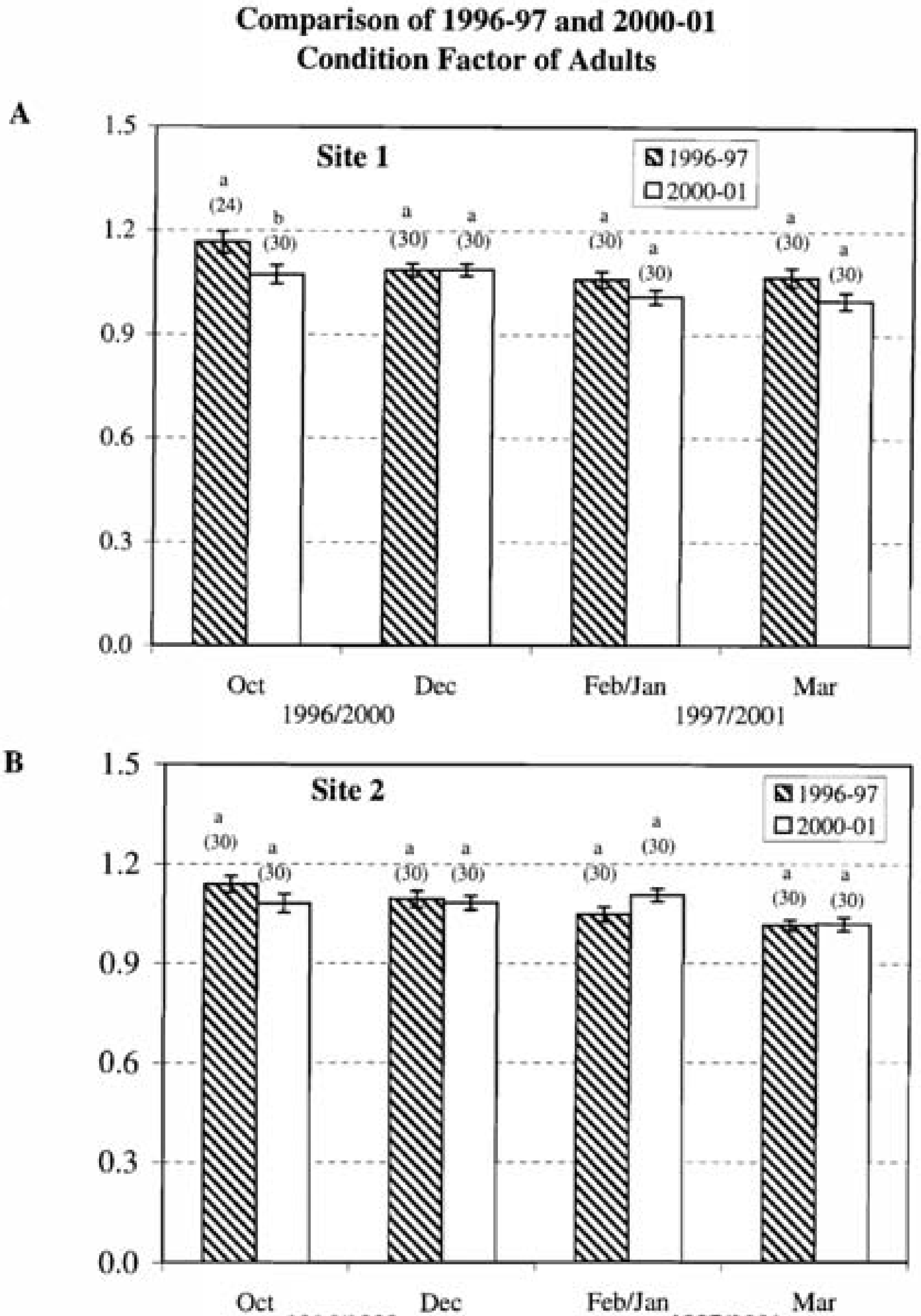

Figure 7. Comparison of 1996-97 and 2000-01 mean condition factor of adult rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

early winter as a result of metabolic costs being higher than energy intake when food resources were limiting.

Normality indices of adults at site 1 in 2000-01 were lower, although not significantly, in all collection months compared to indices of adults at the same site in 1996-97 (Table 1). Normality indices for juveniles at site 1 and for adults and juveniles at site 2 were varied for both collection periods (Tables 1 and 2) with no significant difference. In 2000-01 adults received higher abnormality ratings for eyes, kidneys, and fins than adults in 1996-97, whereas in 1996-97 the higher abnormality ratings occurred mainly in the thymus. In contrast, the juveniles in 2000-01 received higher ratings for the thymus, while in 1996-97 the abnormal ratings were highest in gills, liver and opercles.

Overall, severity indices were within the recommended 10% for "normal" or healthy fish populations throughout the 1996-97 and 2000-01 studies. In 1996-97, the exceptions were adults in March at sites 1 (12.5%) and 2 (14.6%) and juveniles in March at site 1 (10.4%) and in February at site 2 (10.4%) (Tables 1 and 2). The higher indices were due mainly to the degree of hemorrhaging in the thymus and shortening of the opercles. The only exception in the 2000-01 study was in December when the index was 12.1% for adults at site 1 (Tables 1 and 2). It is important to note that evaluation of the thymus weighs heavily in the severity index; however, the rating of the condition of the thymus has questionable interpretation due to broad and generalized effects of a multitude of stressors in wild populations. In an unpublished stress study, Barton observed a higher incident of thymic hemorrhaging in healthy juvenile brook trout (*Salvelinus fontinalis*) than in a diseased population (Goede and Barton 1990) . Thus, the severity index should be interpreted with caution.

No general trends were observed for feeding indices from October to March for either site or size class within 1996-97 and 2000-01; however, differences were observed between sample collections (Tables 1 and 2). Although not statistically significant, adults at site 1 in 1996-97 had higher feeding indices than adults in 2000-01. In contrast, adults at site 2 had significantly lower feeding indices in 1996-97 than in 2000-01. The average feeding index for juveniles at site 1 was the same for 1996-97 and 2000-01. Although not significantly different, juveniles at site 2 in 1996-97 had a lower average feeding index than in 2000-01. An acceptable range for feeding index is greater than 67% with indices below the threshold indicating reduced feeding activity. In 1996-97, half of feeding indices were below the acceptable range for adults while 25% of feeding indices were below the acceptable range for juveniles. In contrast, 25% of feeding indices for adults in 2000-01 were below the acceptable range, while none of the indices were below the acceptable range for juveniles.

A Health Assessment Index (HAI) was calculated in 1996-97 from the necropsy ratings in the Health Condition Profile (USBOR 1998). There were no temporal or spatial trends for HAI for either adults or juveniles; however, adults consistently received more abnormal ratings than juveniles (Figures 8A and B). Likewise, there was no general trend for HAI in 2000-01 (Figures 2A and B). Adults in 2000-01 also exhibited higher HAI indices than juveniles and followed the same fluctuating pattern at each site as adults in 1996-97. The majority of abnormal ratings in 1996-97 were observed in gills, pseudobranchs, and thymus, while the majority of abnormal ratings in 2000-01 were observed in gills, pseudobranchs, and eyes. Only adults at site 1 in October 2000 had a significantly higher HAI index than adults in 1996 (Figure 9A) due to increased abnormalities in fins, opercles, kidney, and the hindgut. Adults at site 1 in December had the greatest level of abnormalities for both collection periods with a subsequent improvement in February 1997 and January 2001. Adults at site 2 had the lowest level of abnormalities in February 1997 and January 2001 (Figure 9B). Juveniles at both sites in 1996-97 had consistently higher HAI indices than juveniles in 2000-01 (except for site 1 in December). However, only site 1 in February 1997 exhibited a statistically higher index (Figures 10A and B).

Little is known about the physiological response of the fish pseudobranch and thymus to environmental stressors. Goede and Barton (1990) suggest the swelling of pseudobranchs may indicate a change in the partial pressure of oxygen and carbon dioxide. Increases in salinity levels may also cause pseudobranchial cell disruption (King et al. 1993). In the thymus, seasonal changes may cause visible physiological alterations. Alvarez et al. (1994) described a decrease in intrathymic erythropoiesis activity during winter, as well as a decrease in thymic size from winter to spring (1998). Further studies of environmental factors that affect these organs need to be conducted before implications of abnormalities observed in wild fish populations can be properly addressed.

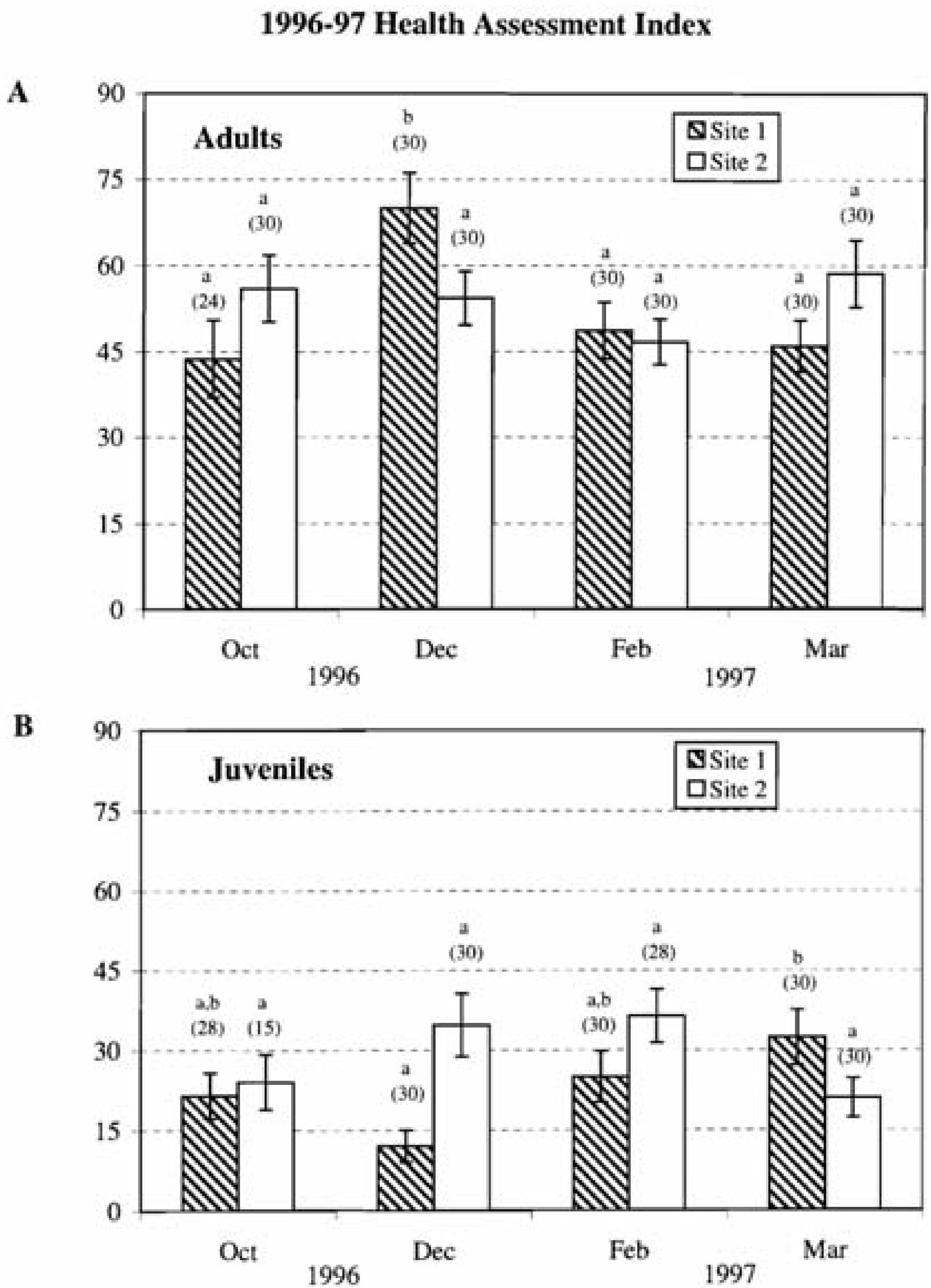

Figure 8. Mean 1996-97 health assessment index of adult (**A**) and juvenile (**B**) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

Comparison of 1996-97 and 2000-01
Health Assessment Index of Adults

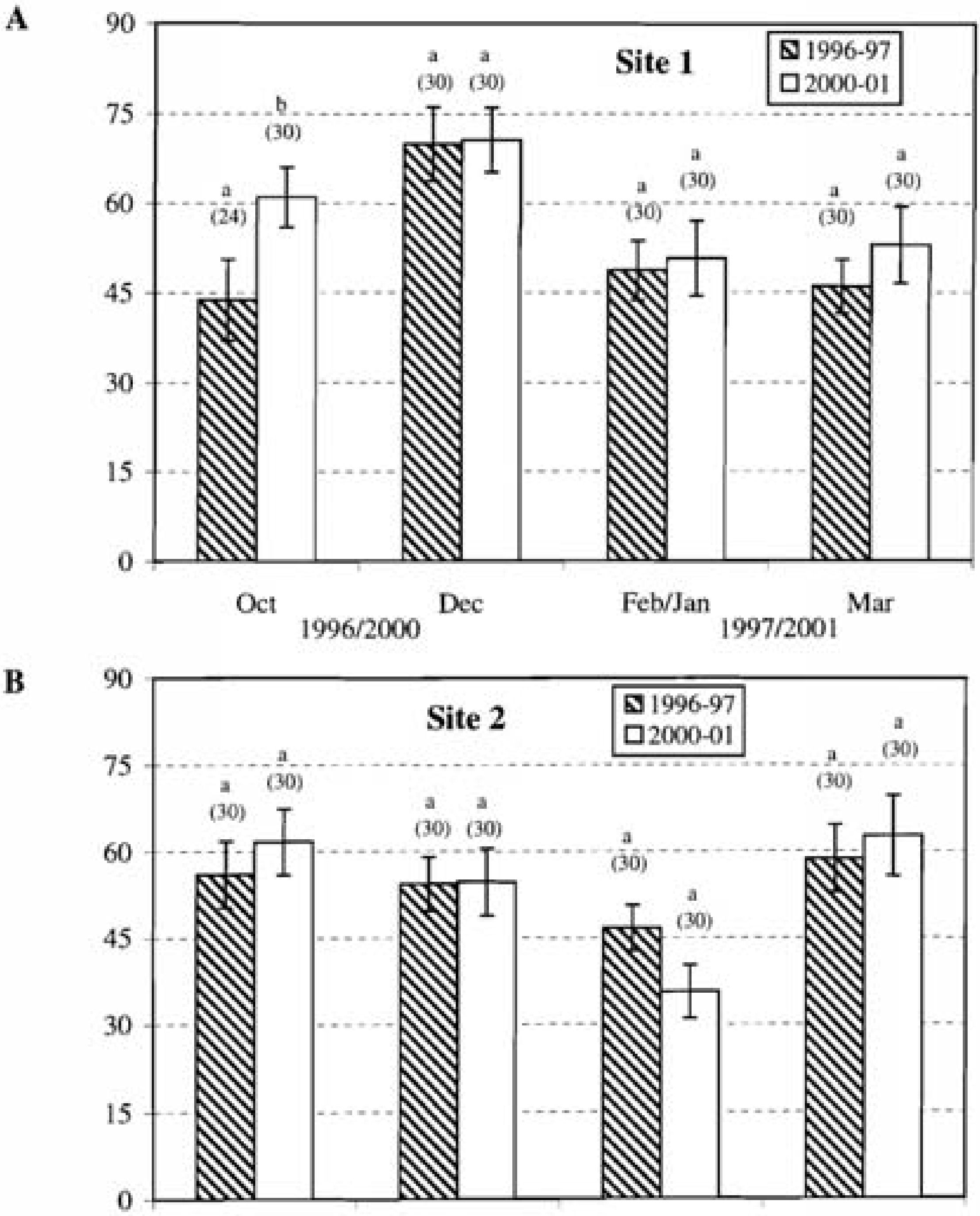

Figure 9. Comparison of 1996-97 and 2000-01 mean health assessment index of adult rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

Comparison of 1996-97 and 2000-01 Health Assessment Index of Juveniles

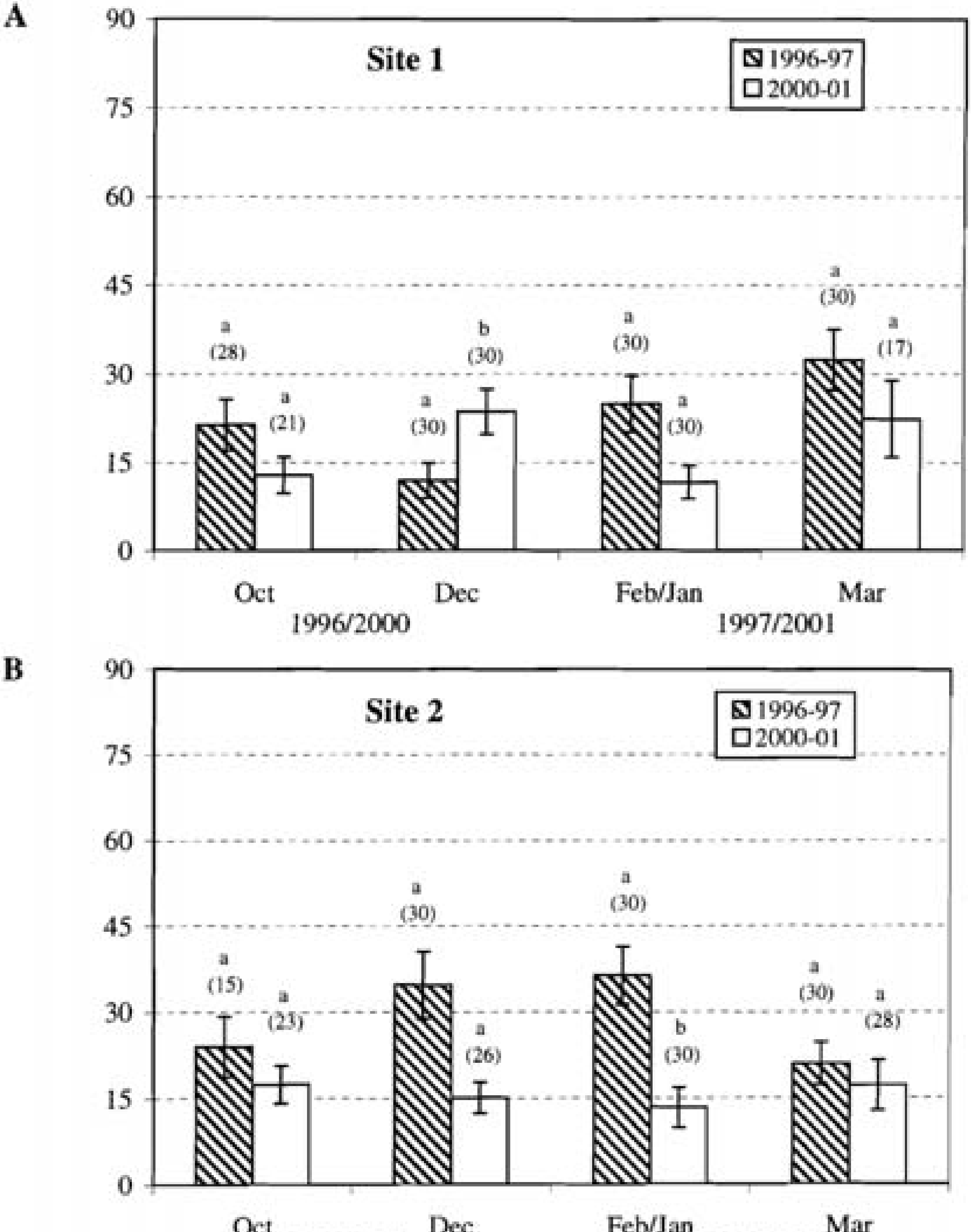

Figure 10. Comparison of 1996-97 and 2000-01 mean health assessment index of juvenile rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

Physiological Indices

Although there was no general trend from October to March for hematocrit within each collection period, values for both size classes at both sites were significantly lower ($P = 0.06$ for adults at site 2) in 2000-01 than in 1996-97 (Tables 1 and 2). Despite the significant difference between collection periods, the range of mean hematocrit for each period (42-53% in 1996-97 and 34-48% in 2000-01) falls within the levels of normality identified for rainbow trout (34-57%, Denton and Yousef 1975; 22-44%, Miller et al. 1983). It is important to point out that hematocrit may vary with season (Denton and Yousef 1975), age (Barnhart 1969), and acute stress prior to blood collection (Fletcher 1975); i.e., hematocrit levels could increase as a result of handling stress. Thus, hematocrit should be interpreted with caution.

Concentrations of total plasma protein in adults at site 1 in 1996-97 and 2000-01 decreased similarly from October to March by 22.7% and 22.4%, respectively (Figure 11A). However, concentrations in October, December, and March 1996-97 were significantly lower in adults at site 1 than the same months in 2000-01 (February 1996 was also lower but not significantly). At site 2, results varied between collection periods for adults with a slight increase from October to March in 1996-97 (2.4%) while concentrations decreased by 26.3% in 2000-01 (Figure 11B). Total protein concentrations were significantly lower in adults at site 2 in 1996-97 than 2000-01 in October and February/January.

Protein concentrations in juveniles at site 1 decreased from October to March in 1996-97 and 2000-01 by 15.2% and 21.4%, respectively (Figure 12A). Between collection periods, however, protein levels were highly variable with October 1996 and March 1997 levels significantly lower than October 2000 and March 2001; December 1996 and 2000 levels were equal; and February 1997 levels were significantly higher than January 2001. Slight decreases were observed in plasma protein concentrations in juveniles at site 2 for both 1996-97 (6.4%) and 2000-01 (3.7%) with concentrations in 1996-97 significantly lower than 2000-01 in October, December, and March (Figure 12B).

The trends in 2000-01 observed for plasma protein concentrations in adults are similar to those observed by Cunjak (1988) in salmonids (which were related to seasonal changes). That trend was not as evident for this study in 1996-97 because of the highly variable pattern exhibited

Comparison of 1996-97 and 2000-01 Total Plasma Protein (g/dL) in Adults

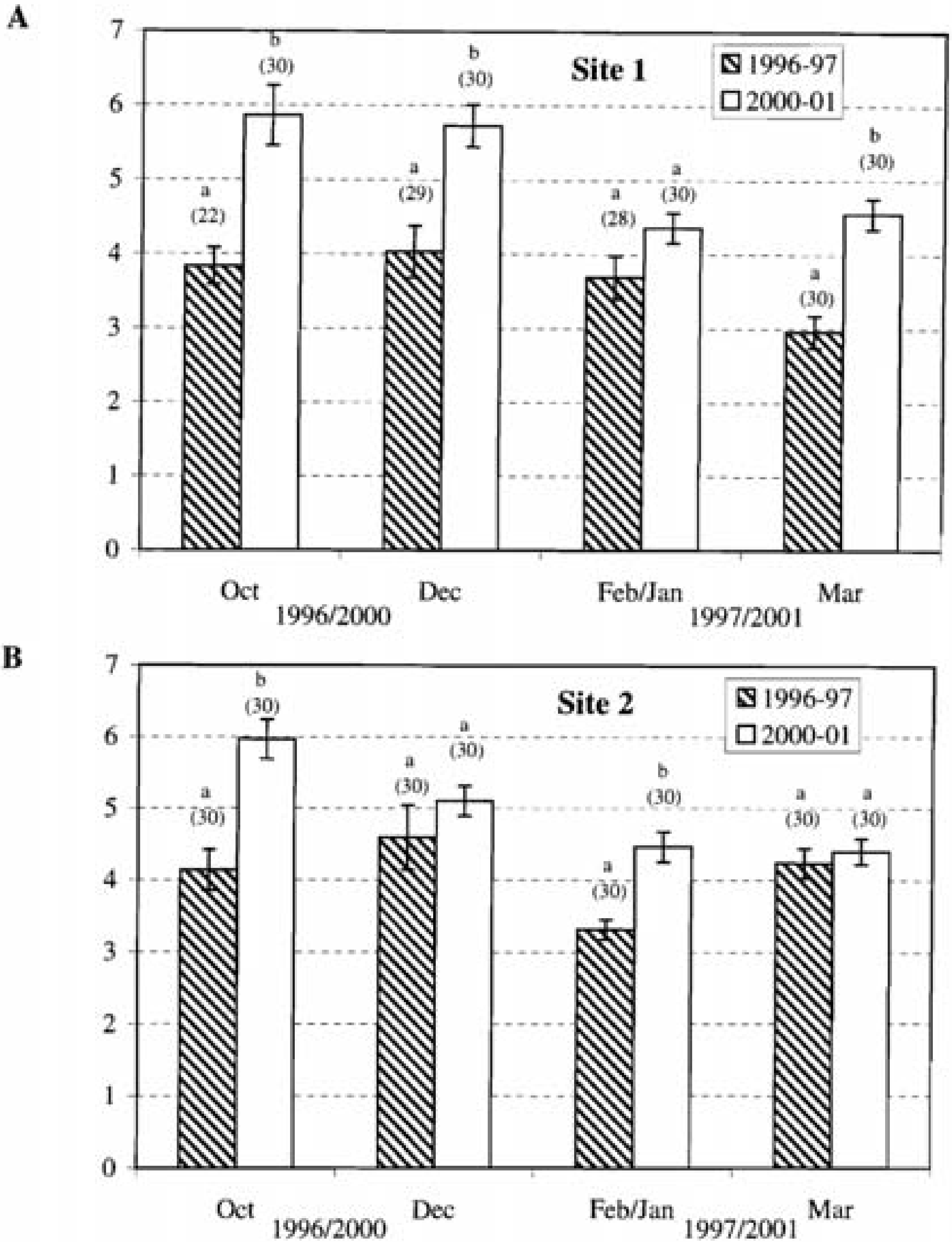

Figure 11. Comparison of 1996-97 and 2000-01 mean total plasma protein (g/dL) in adult rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

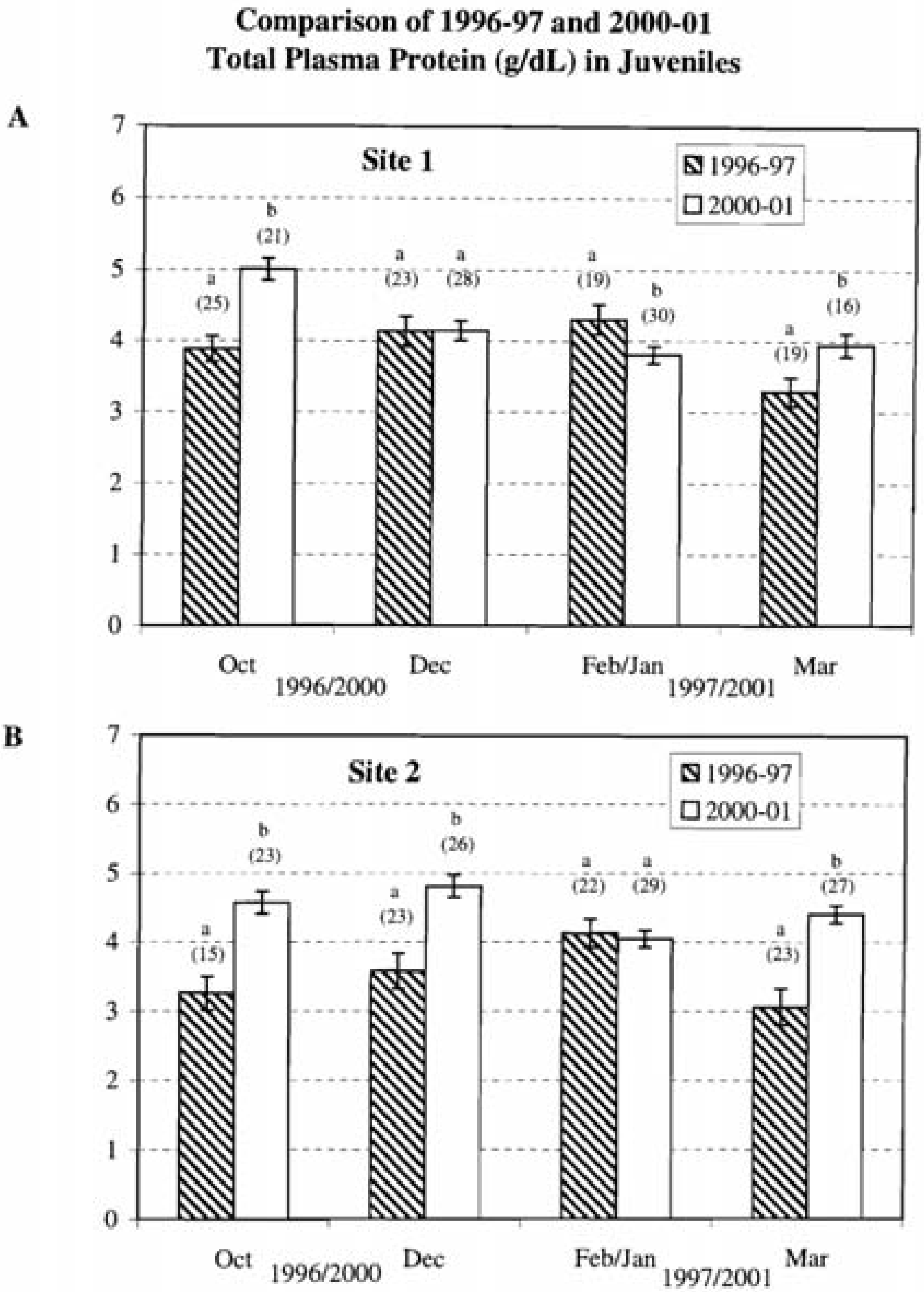

Figure 12. Comparison of 1996-97 and 2000-01 mean total plasma protein (g/dL) in juvenile rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

by adults and juveniles at both sites (Figures 13A and B). However, both size classes in 1996-97 had significantly lower protein concentrations in October before the low flow test began than their counterparts in 2000-01 (Figures 11A,B and 12A,B). Consequently, inherent sample and physiological variation between collections must also be taken into consideration when comparing results of 1996-97 and 2000-01. Thus, interpretation of low-flow effects should be made with caution.

From October to March of 1996-97, percent muscle lipids in adults exhibited a significant decline of 47.8% at site 1 and 45.8% at site 2 (Figures 14A and B). However, 2000-01 lipid levels in adults declined by only 3.2% and 15.7% at sites 1 and 2, respectively (Figure 4A). Between sample collections, lipids in adults at site 1 were consistently lower in 2000-01 than 1996-97 with significant differences observed in October and December (Figure 15A). At site 2, lipid levels were lower in 2000-01 than in 1996-97 in all months except March, although no significant differences were observed (Figure 15B).

In 1996-97, percent muscle lipids in juveniles at site 1 declined significantly from October to March by 65.2% while a non-significant decrease (32%) was observed at site 2 (Figure 14B). In 2000-01, juveniles at both sites exhibited significant declines in lipid levels from October to March (48.4% at site 1 and 53.5% at site 2) (Figure 4B). Lipid levels in juveniles between sample collections were varied at site 1 with October and December 1996 slightly higher than 2000, but February and March 1997 significantly lower than 2001 (Figure 16A). At site 2, juvenile lipids were consistently higher in 2000-01 than in 1996-97 with significant differences between February/January and March (Figure 16B).

Depletion of energy stores through autumn and winter in salmonids has been documented by others (Cunjak and Power 1986; Cunjak 1988). Cunjak and Power (1987) observed fish were unable to effectively assimilate ingested foods in winter, resulting in lower energy intake while metabolic costs remained the same. Adults at site 1 in 1996-97 exhibited a seasonal trend whereas adults in 2000-01 showed little change throughout the collection year. Lipids in juveniles at site 1 in 1996-97 also followed a seasonal pattern while juveniles in 2000-01 had fluctuating levels throughout the collection year. Adults and juveniles at site 2 in both sample collections exhibited varying lipid levels among the four sampling periods with no trends

1996-97 Total Plasma Protein (g/dL)

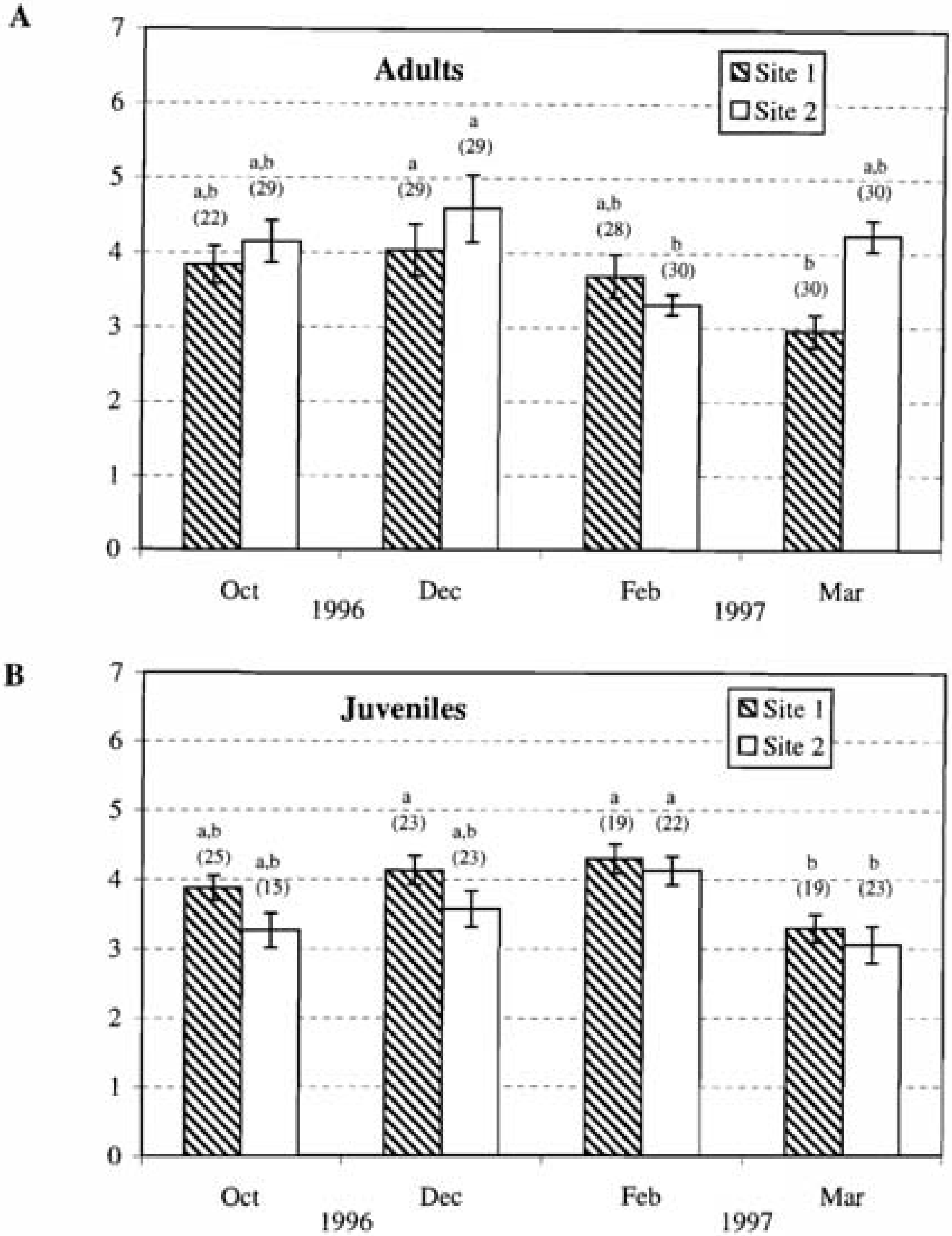

Figure 13. Mean 1996-97 total plasma protein (g/dL) in adult (A) and juvenile (B) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

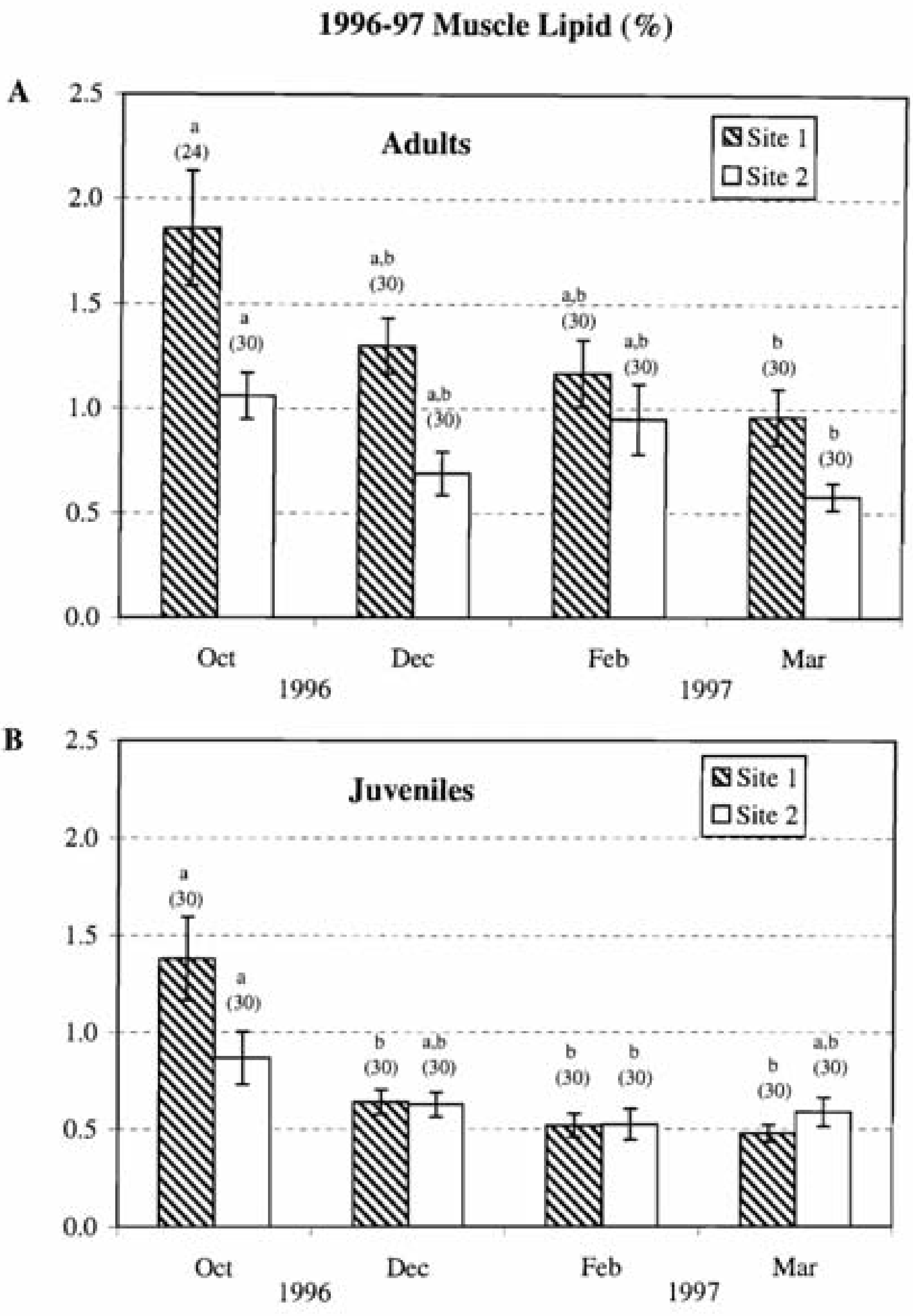

Figure 14. Mean 1996-97 percent muscle lipid (wet weight) in adult (**A**) and juvenile (**B**) rainbow trout collected on four sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

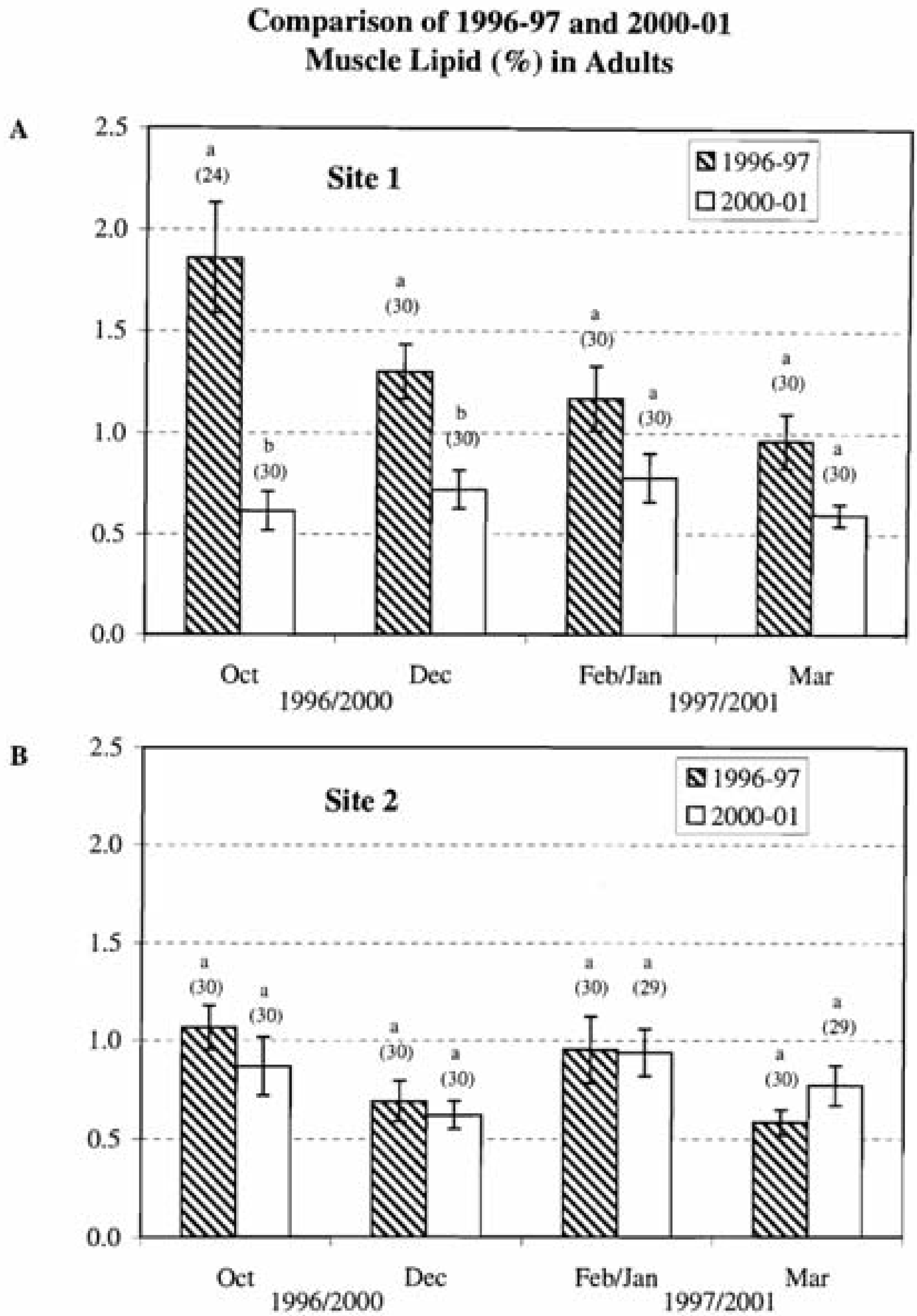

Figure 15. Comparison of 1996-97 and 2000-01 mean percent muscle lipid (wet weight) in adult rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

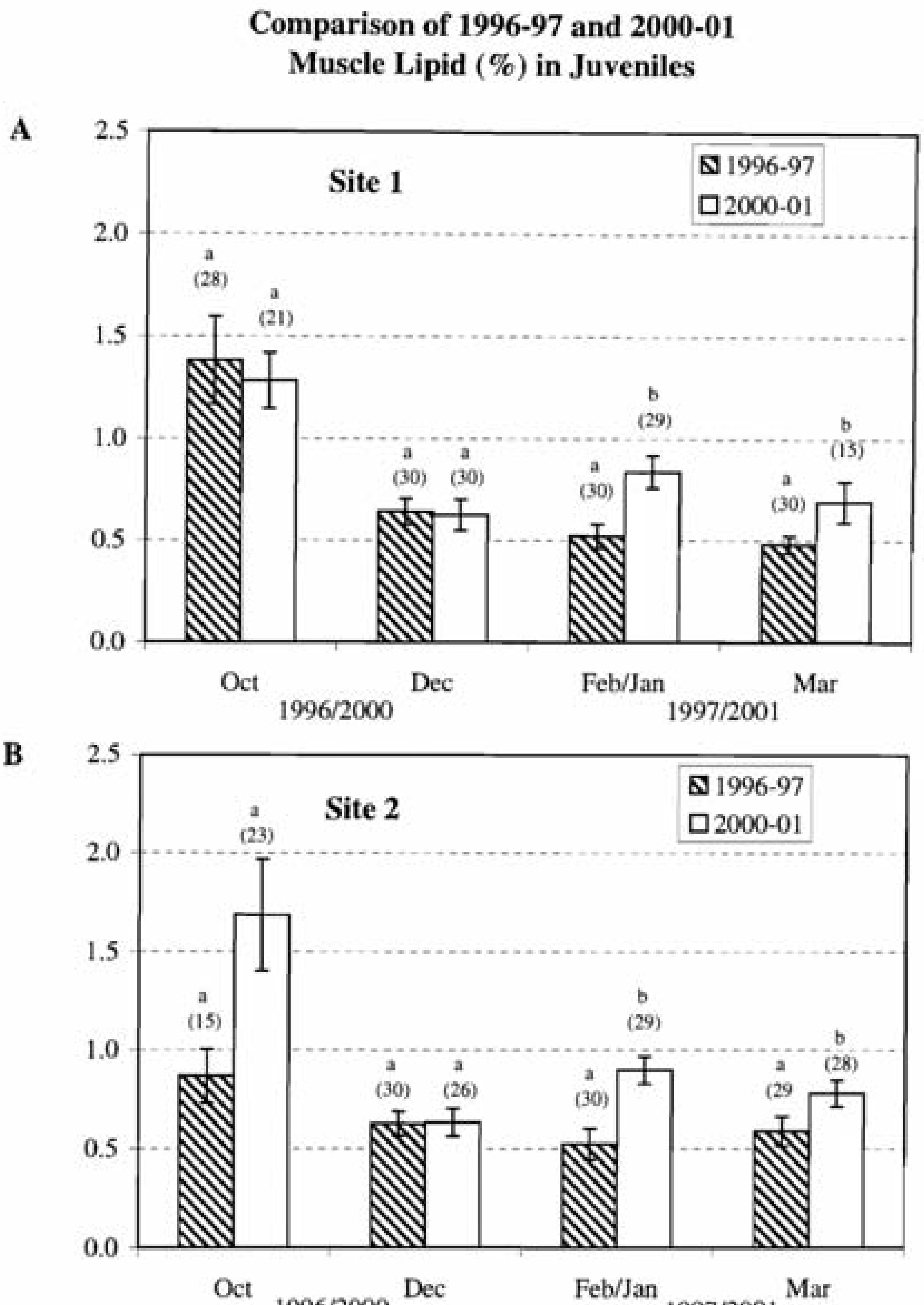

Figure 16. Comparison of 1996-97 and 2000-01 mean percent muscle lipid (wet weight) in juvenile rainbow trout collected on four sample dates each collection year from site 1 (**A**) (Navajo Dam to Texas Hole) and site 2 (**B**) (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a month, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

observed except for the overall decrease from October to March. The absence of a distinguishable pattern between 1996-97 and 2000-01 precludes an accurate interpretation of seasonal versus low-flow effects.

Fish Health Assessment: August 2001

Health Condition Profile

For the August 2001 collection, mean lengths of adults and juveniles at site 1 were 414.4 mm and 155.7 mm, respectively (Table 1). Mean lengths of adults and juveniles at site 2 were 441.1 mm and 176.7 mm, respectively (Table 2). Sex ratios once again were slightly skewed with 53% of adults identified as females from site 1 and 60% from site 2. Of the adult females, 56% from site 1 and 72% from site 2 were gravid (Appendix A). Condition factors increased significantly from March to August for adults at site 1 and for juveniles at both sites (Figures 17A and B). The 6.4% increase for adults at site 2 was not statistically significant but may be biologically significant in reflecting a seasonal pattern of increased fitness through the summer months across both sites and sizes (Figure 17A).

Normality indices for both sites and size classes were below the accepted 90% range for the month of August; however, this represented little change from the March indices (Tables 1 and 2). Although severity indices decreased from 6.3% in March to 4.2% in August for adults at site 2, adults at site 1 increased from 4.6% to 10.0%. Juveniles increased at both sites in August to the highest levels of the collection period (11.7% at site 1 and 13.3% at site 2) (Tables 1 and 2). Hemorrhaging in the thymus was again the main contributing factor. Generally, feeding indices increased in August for both sites and sizes to the highest levels of the collection period, except for adults at site 1 which decreased to 60.0% (Tables 1 and 2). No significant difference was detected in the health assessment index for the month of August for either site or size class (Figures 18A and B).

Physiological Indices

Hematocrit levels in August for adults and juveniles at both sites remained in the range observed in the previous 2000-01 sampling periods (Tables 1 and 2). Although the difference

2000-01 Condition Factor (Including August Data)

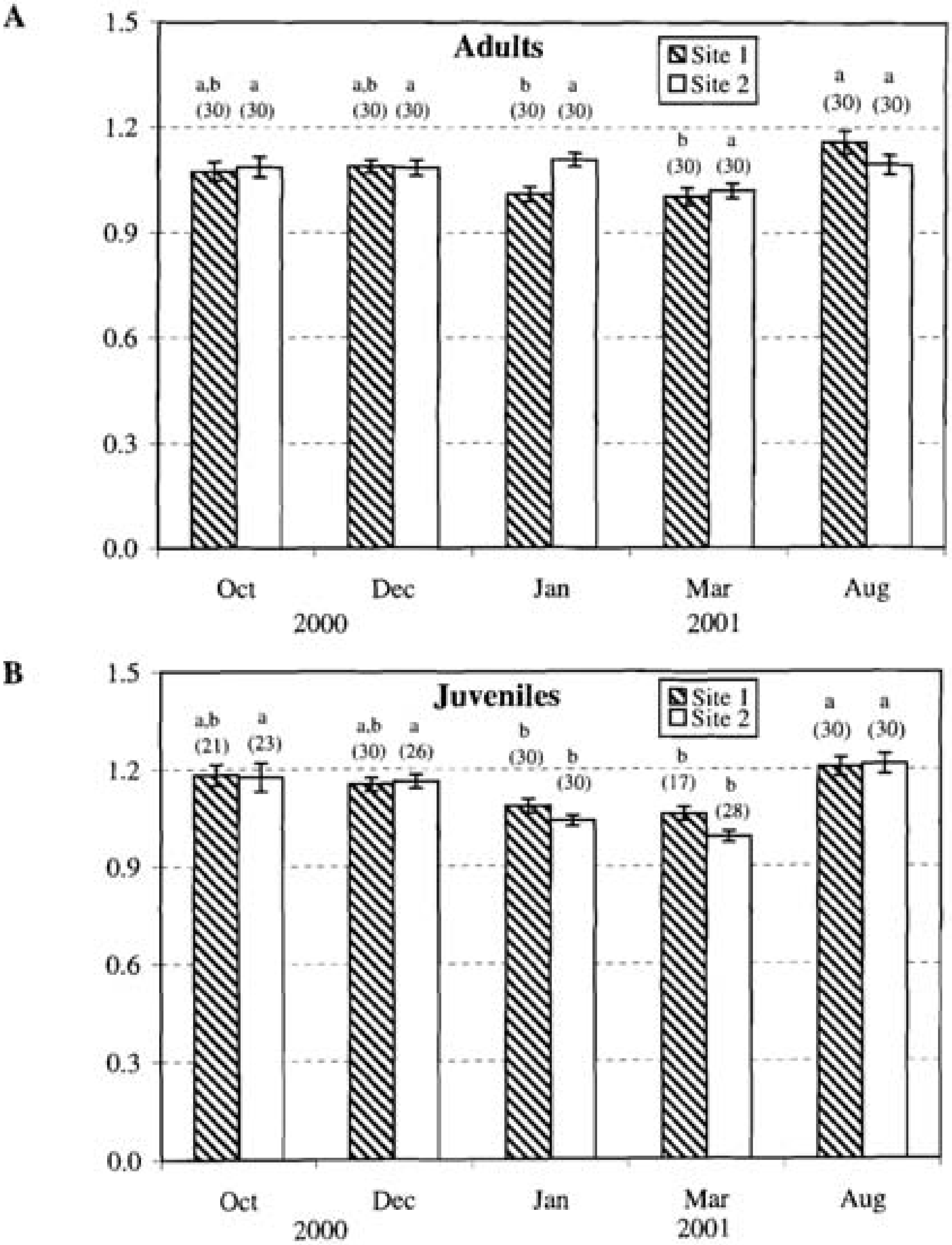

Figure 17. Mean 2000-01 (including August data) condition factor of adult (**A**) and juvenile (**B**) rainbow trout collected on five sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

2000-01 Health Assessment Index (Including August Data)

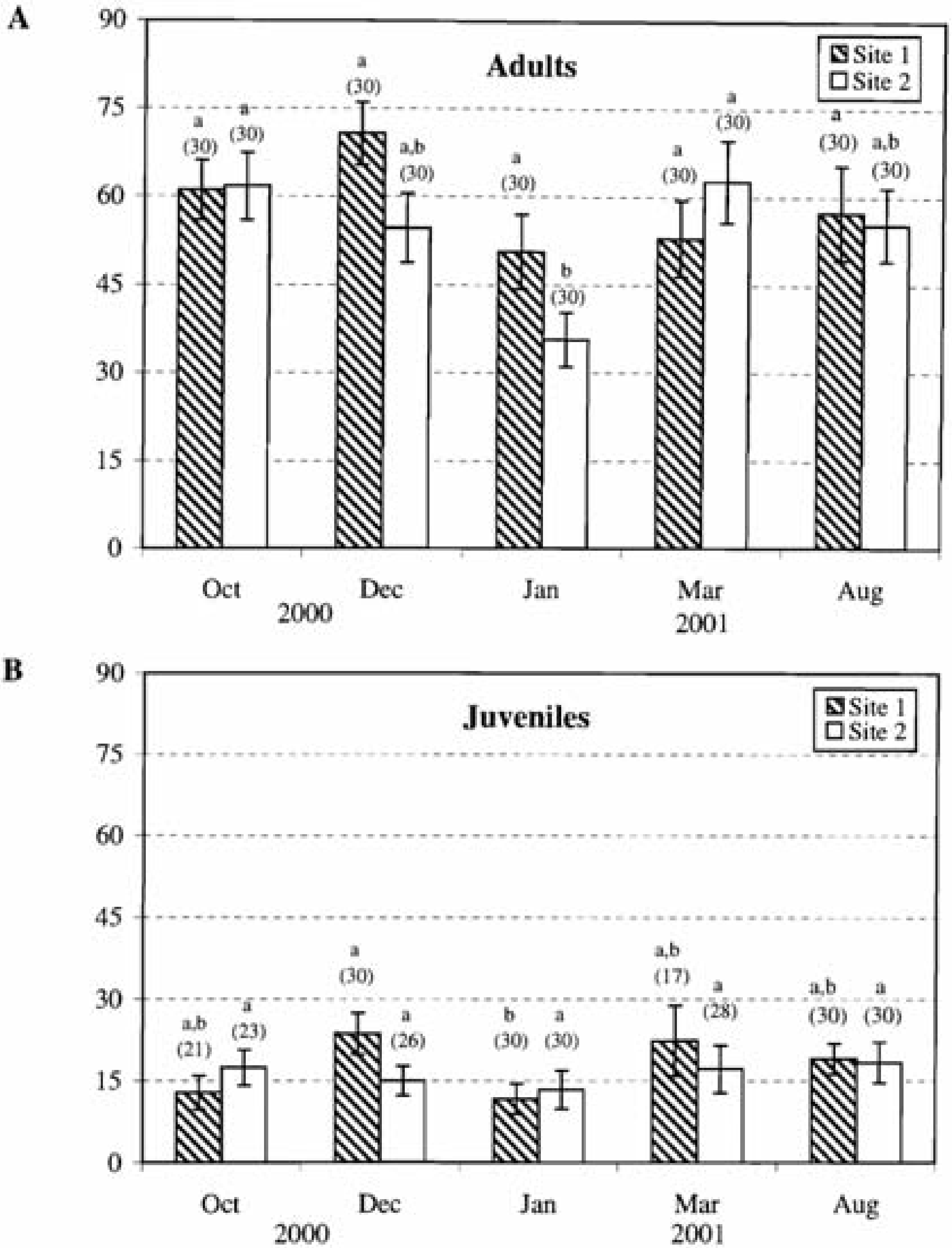

Figure 18. Mean 2000-01 (including August data) health assessment index of adult (**A**) and juvenile (**B**) rainbow trout collected on five sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

was not statistically significant, total plasma protein in adults at site 1 and 2 reflected a seasonal increase from March to August (Figures 19A). Protein levels in juveniles at both sites also increased slightly in August (Figure 19B). A seasonal pattern was observed over the 2000-01 collection year in both adults and juveniles as protein levels decreased from October to January and then began increasing in March and August. With the addition of the August data, muscle lipids in juveniles from both sites also exhibited a seasonal pattern with a significant decrease in lipid levels from October to March and a subsequent significant increase from March to August (Figure 20B). Lipid levels in adults at both sites also increased significantly from March to August; however, no seasonal trend was observed due to the low levels measured in October (Figure 20A).

CONCLUSIONS AND RECOMMENDATIONS

Analysis of the data between the low-flow test (1996-97) and baseline study (2000-01) revealed relatively few significant differences. No relevant differences were observed in condition factor, normality index, severity index, feeding index, and HAI between 1996-97 and 2000-01. Although hematocrit was greater in 1996-97 than in 2000-01, all values were within normal ranges published for rainbow trout. Total plasma protein exhibited a seasonal trend of decreasing concentrations for both age classes at site 1 (Navajo Dam to Texas Hole) while results varied at site 2 (Texas Hole to the end of the special regulation water) in both sample collections. Despite this general similarity, protein levels were generally lower in 1996-97 than in 2000-01. However, total protein in both size classes and sites were statistically lower in October 1996 (before the low flow began) than in October 2000, indicating that the lower 1996-97 levels may be unrelated to the test. Percent muscle lipid levels showed no trend among size classes or sites within either sample collection. The lower mesentery fat reserves and percent muscle lipids observed in adults in October 2000 are unexplained. October was the only month in the 2000-01 sampling period in which lipid levels of adults and juveniles were not similar. When considering the expected seasonal increase in lipid levels (as seen in August 2001 for both size classes), the low levels recorded for adults in October 2000 may be due to a disruption in the food source.

2000-01 Total Plasma Protein (g/dL) (Including August Data)

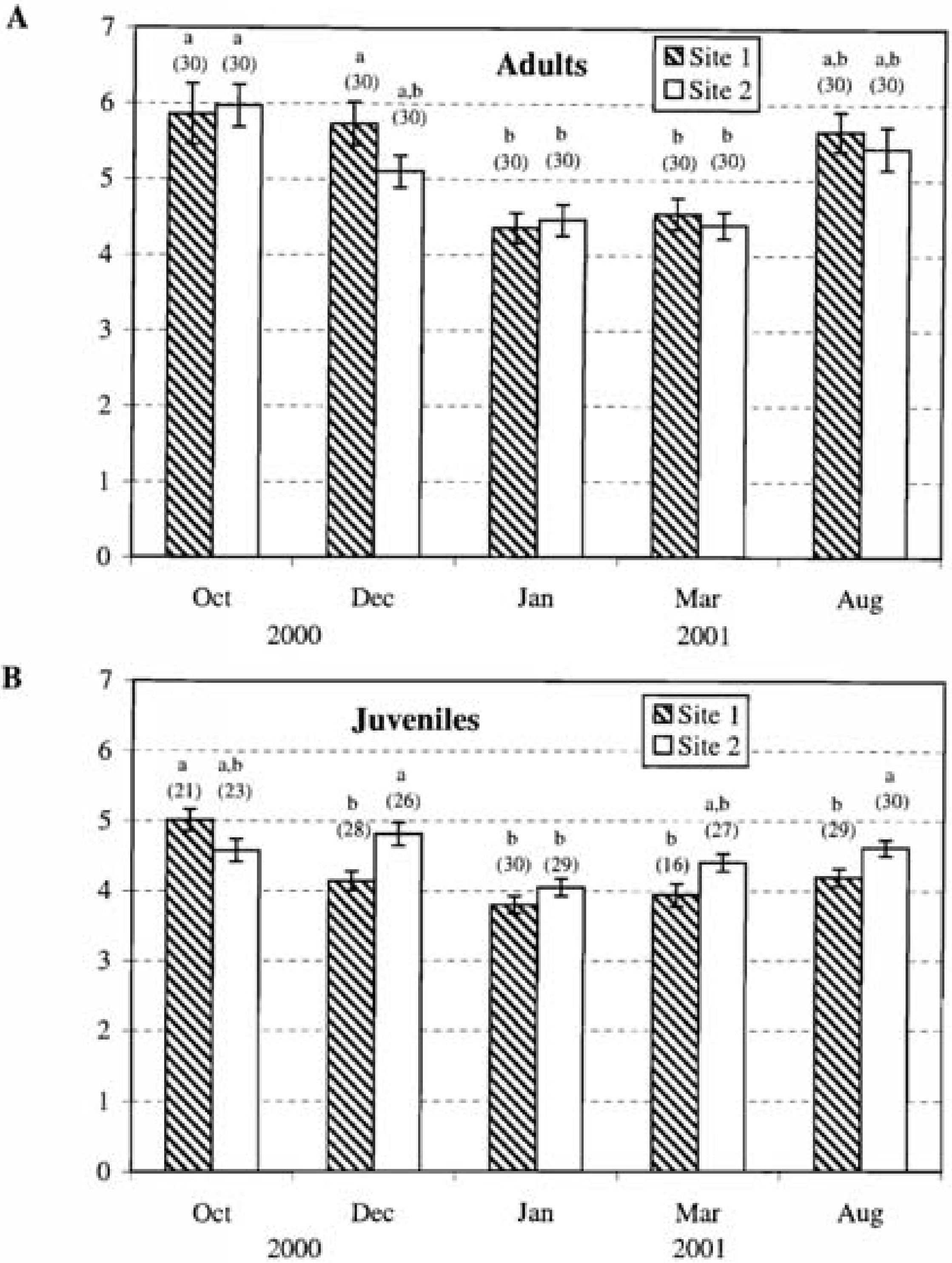

Figure 19. Mean 2000-01 (including August data) total plasma protein (g/dL) in adult (**A**) and juvenile (**B**) rainbow trout collected on five sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

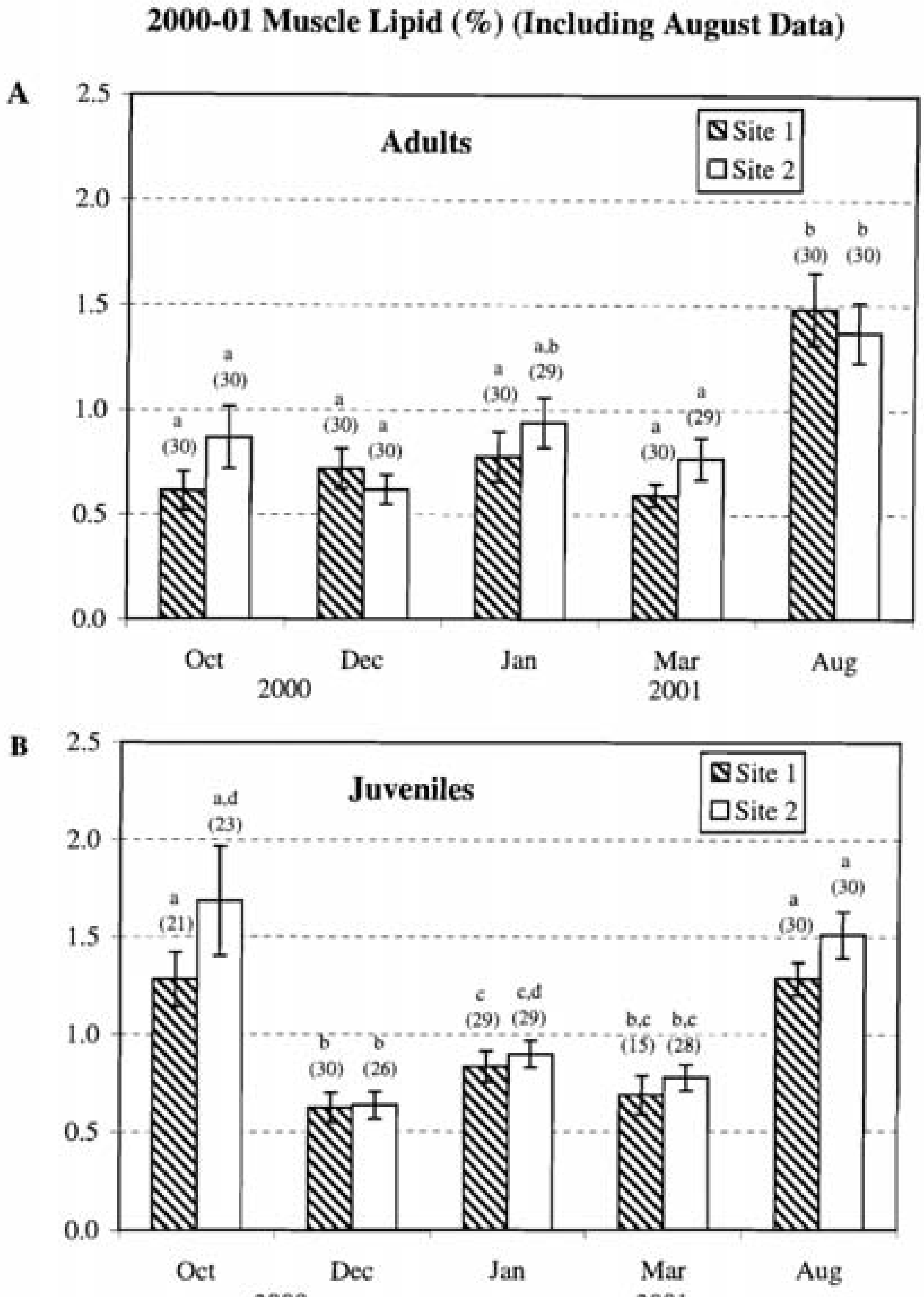

Figure 20. Mean 2000-01 (including August data) percent muscle lipid (wet weight) in adult (**A**) and juvenile (**B**) rainbow trout collected on five sample dates from site 1 (Navajo Dam to Texas Hole) and site 2 (Texas Hole to the end of the special regulation water) on the San Juan River. Vertical bars represent standard error of the mean. Within a site, values having the same letter are not significantly different from each other. Sample sizes are in parentheses.

The presence of such an anomaly as well as high variability among the health condition parameters confounds the interpretation of baseline data collected from only a one-year study.

Therefore, two important questions arise that cannot be adequately addressed by the low-flow test and baseline study: 1) are data from the 2000-01 collection period an accurate baseline for the San Juan River rainbow trout population, and 2) are the differences observed between the low-flow test and baseline study an artifact of the low-flow or because of inherent variability within the San Juan River system (i.e., attributable to differences in annual rainfall, diurnal and seasonal temperature fluctuations, invertebrate biomass, degrees of fishing pressure). If flow was reduced to 250 cfs when rainbow trout have lower energy reserves (as was observed in October 2000), the effects on the overall health of the population may be different than observed in 1996-97 (when the population began the winter season with higher energy reserves). Also the effect of habitat type and food resources within the San Juan River on adult versus juvenile health warrant further study to provide possible explanations for differences observed between the two size classes and the two sites in the various health condition parameters.

We conclude the health of the rainbow trout population did not appear to be negatively impacted by the 1996-97 low-flow test. However, potential chronic effects of extended low flows cannot be adequately assessed from the data collected in 1996-97 and in 2000-01. Based on results presented in this report, a 4-month low-flow test and a one-year baseline study do not provide sufficient data to fully interpret the impact of multiple variables (both inherent and anthropogenic) on fish health. We recommend implementation of a multi-year baseline study in conjunction with monitoring future low flows to further assess seasonal versus low-flow effects on the long-term health of the rainbow trout population in the San Juan River.

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ATTACHMENT A

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	1SJ1A
Species:	RT	Necropsy Date:	October 24, 2000	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	FALL BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	437.4	29.99	500	385	6.9%
Weight (g)	908.1	214.6	1336.0	543.0	23.6%
Ktl * 105	1.0726	0.15	1.3931	0.7293	13.7%
Ctl * 104	3.8752		5.0333	2.6351	
Hematocrit	34.036	9.60	50	10	28.2%
Leucocrit	1.125	0.22	1.5	1.0	19.6%
Plasma Protein	5.858	2.20	10.6	1.4	37.6%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

N 73% B1 23% B2 E1 E2 H1 H2 M1 M2 OT 3%	N 67% F 13% C 3% M 17% P OT	N 20% S 10% L 43% S&L 27% I OT	0 83% 1 17% 2 X 0.17	0 53% 1 40% 2 7% 3 4 X 0.53	B 53% R 10% G 27% NO 7% E OT 3%	0 87% 1 13% 2 X #####	N 70% S 17% M 7% G U 7% OT	A 77% B 17% C D E 3% F 3% OT	0 57% 1 17% 2 13% 3 13% X 0.83	0 100% 1 2 X 0	0 80% 1 20% 2 X 0.20	N V M C O F R OT	N R OP F L T OT	N Pc Pl An V C Ad D OT
Summary of Normals														
73%	67%	20%	83%		90%	87%	70%	93%		100%	80%			
Summary of Means												Mean deformities		
			.1 67	.5 33		0.13			0.83	0	0.20			
Summary of Specific Percent Indices												Percent of possible		
			8.33%	13.3%		6.67%			27.8%	0%	10.00%			

Summary of Combined Percent Indices

Normality index:	76.3	Severity Index:	6.25	Feeding Index:	72.2

Sex: M 33% F 67% U

General Remarks

Fins

Skin

Gonads many females were gravid, but notations were not made

Other one fish with spinal deformity, 8 fish with damage from anglers

File: 1SJ1A

Fish Necropsies

Wildlife Resources 11/99

Date 24-Oct-00 Unit ______ Species RT Strain ______ Quality Control # 1SJ1A
Location SAN JUAN RIVER Fish source ______ Age ADULT Case History # ______
Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______
Investigator(s) BOR/NMDGF Water temp C° ______ Water Hardness ______
Reason for necropsy: FALL BASELINE Code ___ Remarks DAM TO TEXAS HOLE
Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1A1	413	543	0.771	OT	N	L	0	0	B	0	N	A	2	F			4.12	0	0				damaged eye, no blood for hematocrit
1A2	468	1057	1.031	N	N	S	1	1	B	0	N	A	0	M	44	1	4.96	0	0				
1A3	443	931	1.071	N	M	L	0	1	R	0	N	A	1	F	37	1.5	6	0	1				one operacle short
1A4	437	989	1.185	N	N	S&L	0	0	G	0	N	A	0	F	43	1.5	7.76	0	0				
1A5	392	721	1.197	N	F	N	0	0	NO	0	N	E	0	M	18	1.5	4.62	0	1				enlarged spleen, parasites in hindgut
1A6	434	938	1.147	N	F	L	0	1	OT	0	M	B	0	M	28	1	4.65	0	0				
1A7	385	795	1.393	N	M	S&L	0	1	B	0	S	A	1	F	23	1	10.6	0	0				
1A8	485	1336	1.171	N	M	S&L	0	1	B	0	S	A	1	F	24	1	4.93	0	0				hook mark on jaw
1A9	435	917	1.114	N	N	L	1	2	G	1	M	A	0	M	34	1	5	0	1				
1A10	478	1258	1.152	N	M	S&L	0	0	B	1	N	A	3	F	28	1	8.21	0	0				enlarged liver, hook mark
1A11	485	1255	1.100	N	N	S	0	0	B	0	U	A	0	M	41	1	4.29	0	0				kidney swollen
1A12	422	785	1.045	B1	N	L	0	1	B	0	N	B	0	F	25	1	7.62	0	1				gravid
1A13	500	1114	0.891	B1	N	S&L	0	0	B	1	N	F	2	F	32	1	3.97	0	1				hook marks
1A14	416	596	0.828	B1	N	S&L	0	0	G	0	U	A	2	M	27	1	4.25	0	0				
1A15	415	686	0.960	B1	N	L	0	0	G	0	N	A	1	M	35	1.5	5.57	0	0				damaged jaw
1A16	403	646	0.987	N	M	L	0	0	B	0	N	A	0	M	10	1	1.36	0	0				pyloric caecae attch/abdmn, parasites
1A17	446	914	1.030	N	N	S&L	1	0	G	0	N	A	3	F	32	1	5	0	0				hook mark on jaw
1A18	450	1096	1.203	N	N	L	0	1	R	0	N	A	2	F	38	1	6.68	0	0				
1A19	455	1168	1.240	N	N	L	0	0	B	0	S	A	0	F	32	1	6.52	0	0				
1A20	456	1003	1.058	N	F	S&L	0	1	B	0	S	A	0	F	27	1.5	6.51	0	0				hook mark on jaw
1A21	420	960	1.296	N	N	L	0	0	B	0	N	B	0	F	40	1	7.14	0	0				
1A22	431	743	0.928	N	N	L	0	0	NO	0	N	B	3	M	35	1	4.14	0	0				spinal deformity
1A23	436	925	1.101	N	N	L	1	2	G	0	N	A	1	F	48	1.5	6.91	0	1				eroded operacle, parasites in hindgut
1A24	422	846	1.126	N	N	N	0	1	R	0	N	A	0	F	43	1.5	7.31	0	0				
1A25	394	685	1.120	N	N	L	1	1	G	0	N	A	0	F	44	1	10.5	0	0				
1A26	444	895	1.023	B1	C	N	0	0	R	0	N	B	0	F	30	1	9.81	0	0				
1A27	473	1167	1.103	N	N	S	0	1	B	0	N	A	0	F	49	1	5.86	0	0				
1A28	455	687	0.729	B1	N	N	0	0	B	1	N	A	3	F			1.43	0	0				no hematocrits, fish line thru vent
1A29	438	1003	1.194	N	F	N	0	1	B	0	S	A	0	F	50	1	5.36	0	0				
1A30	390	584	0.985	B1	N	N	0	0	G	0	N	A	0	M	36	1	4.64	0	0				

General Remarks

Fins ______
Gonads many females were gravid, but notations were not made
Skin ______
Other one fish with spinal deformity, 8 fish with damage from anglers

Summary of Necropsies

Location: SAN JUAN RIVER | Quality Control No.: 15J1B

Species:	RT	Necropsy Date:	October 24, 2000	Sample Size:	21
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	FALL BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	169.7	26.58	226	138	15.7%
Weight (g)	61.9	30.9	131.0	25.0	50.0%
Ktl * 105	1.1822	0.15	1.4741	0.9513	12.3%
Ctl * 104	4.2713		5.3258	3.4369	
Hematocrit	48.421	7.93	63	37	16.4%
Leucocrit	1.263	0.35	2.0	1.0	27.6%
Plasma Protein	5.007	0.72	6.7	3.8	14.4%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Gut	Opercle	Deformities	Skin Lesions	Fin Deformities
N 100% B1 B2 E1 E2 H1 H2 M1 M2 OT	N 95% F 5% C M P OT	N 81% S L 19% S&L I OT	0 43% 1 57% 2 X 0.57	0 1 76% 2 10% 3 14% 4 X 1.38	B 19% R 76% G 5% NO E OT	0 100% 1 2 X 0	N 100% S M G U OT	A 29% B 71% C D E F OT	0 29% 1 67% 2 5% 3 X 0.76	0 100% 1 2 X 0	0 100% 1 2 X	N V M C O F R OT	N R OP F L T OT	N Pc Pl An V C Ad D OT
					Summary of Normals									
100%	95%	81%	43%		100%	100%	100%	100%		100%	100%			
					Summary of Means							Mean deformities		
			.5 71	1.3 81		0			0.76	0				
					Summary of Specific Percent Indices							Percent of possible		
			28.57%	34.5%		0%			25.4%	0%	0			

Summary of Combined Percent Indices

Normality index:	91.9	Severity Index:	7.14	Feeding Index:	74.6

Sex: M 19% F 43% U 38%

General Remarks

Fins

Skin

Gonads

Other

File: 15J1B

Fish Necropcies

Wildlife Resources 11/99

Date 24-Oct-00 Unit ____ Species RT Strain ____

Location SAN JUAN RIVER Fish source ____ Age JUVENILE

Mark/lot ____ Egg source ____ Hatch date ____

Investigator(s) BOR/NMDGF Water temp C° ____

Reason for necropsy: FALL BASELINE Code ____ Remarks ____

Disease survey No: ____ Custody No ____

Quality Control # 1SJ/1B

Case History # ____

Tissue Collection # ____

Water Hardness ____

DAM TO TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1B1	175	79	1.474	N	N	L	1	1	R	0	N	B	0	M	53	1	6.23	0	0				
1B2	224	117	1.041	N	N	N	1	1	R	0	N	B	0	F	42	1.5	4.91	0	0				
1B3	226	131	1.135	N	N	N	1	1	R	0	N	B	1	U	37	1	4.8	0	0				
1B4	181	67	1.130	N	F	N	1	2	R	0	N	B	1	U	52	1	5.45	0	0				
1B5	179	75	1.308	N	N	L	1	3	G	0	N	A	0	F	58	1.5	6.16	0	0				
1B6	156	47	1.192	N	N	N	1	1	B	0	N	A	1	F	57	1	4.57	0	0				
1B7	161	44	1.054	N	N	N	1	1	R	0	N	B	0	F	43	1.5	3.75	0	0				
1B8	150	35	1.037	N	N	N	1	3	R	0	N	B	1	U	58	1	5.17	0	0				
1B9	141	28	0.999	N	N	N	0	1	R	0	N	B	1	U	54	1	5.04	0	0				
1B10	160	57	1.392	N	N	N	1	2	R	0	N	B	1	U	40	2	4.35	0	0				
1B11	168	55	1.160	N	N	N	0	1	R	0	N	B	1	U	44	1.5	4.66	0	0				
1B12	150	39	1.156	N	N	N	0	1	R	0	N	B	1	M	37	1.5	4.1	0	0				
1B13	158	42	1.065	N	N	L	0	1	R	0	N	B	1	F	44	2	4.84	0	0				
1B14	165	56	1.247	N	N	N	0	1	R	0	N	B	0	F			4.23	0	0				no blood for hematocrits
1B15	165	55	1.224	N	N	N	1	1	R	0	N	B	1	U	52	1	5.21	0	0				
1B16	138	25	0.951	N	N	L	0	3	B	0	N	A	2	U	48	1	5.57	0	0				
1B17	140	30	1.093	N	N	N	1	1	B	0	N	A	1	F			4.94	0	0				no blood for hematocrits
1B18	152	47	1.338	N	N	N	0	1	R	0	N	B	1	M	49	1	4.93	0	0				
1B19	226	126	1.092	N	N	N	1	1	R	0	N	A	1	M	52	1	6.71	0	0				
1B20	161	57	1.366	N	N	N	0	1	R	0	N	A	1	F	63	1.5	4.98	0	0				
1B21	185	87	1.374	N	N	N	0	1	B	0	N	B	0	F	37	1	4.54	0	0				

General Remarks

Fins ____ Gonads ____

Skin ____ Other ____

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	1SJ2A
Species:	RT	Necropsy Date:	October 25, 2000	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	FALL BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	438.6	20.63	475	380	4.7%
Weight (g)	923.1	198.5	1333.0	549.0	21.5%
Ktl * 105	1.0849	0.16	1.3634	0.6273	14.5%
Ctl * 104	3.9197		4.9260	2.2663	
Hematocrit	44.300	13.10	69	7	29.6%
Leucocrit	1.150	0.35	2.0	1.0	30.5%
Plasma Protein	5.965	1.53	10.1	3.4	25.7%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 83%	N 67%	N 10%	0 83%	0 50%	B 70%	0 100%	N 63%	A 83%	0 63%	0 77%	0 93%	N	N	N
B1 7%	F 3%	S 10%	1 13%	1 40%	R	1	S 33%	B 17%	1 7%	1 17%	1 7%	V	R	Pc
B2	C 20%	L 57%	2 3%	2 10%	G 23%	2	M	C	2 13%	2 7%	2	M	OP	Pi
E1	M 3%	S&L 23%	X 0.20	3	NO 7%	X 0	G	D	3 17%	X #####	X 0.07	C	F	An
E2 3%	P	I		4	E		U 3%	E	X 0.83			O	L	V
H1	OT 7%	OT		X 0.60	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT 7%														
Summary of Normals														
83%	67%	10%	83%		93%	100%	63%	100%		77%	93%			
Summary of Means												Mean deformities		
			.2	.6		0			0.83	0.30	0.07			
Summary of Specific Percent Indices												Percent of possible		
			10.00%	15.0%		0%			27.8%	15.00%	3.33%			

Summary of Combined Percent Indices

Normality index:	77.0	Severity Index:	7.08	Feeding Index:	72.2

Sex: M 27% F 73% U

General Remarks

Fins

Skin one fish w/lesion on abdomen

Gonads several females were gravid, but notations were not made

Other 8 fish with damage from anglers

File: 1SJ2A

Fish Necropcies

Wildlife Resources 11/99

Date 25-Oct-00 Unit Species RT Strain

Location SAN JUAN RIVER Fish source Age ADULT

Mark/lot Egg source Hatch date

Investigator(s) BOR/NMDGF Water temp C°

Reason for necropsy: FALL BASELINE Code Remarks

Disease survey No: Custody No

Quality Control # 1SJ2A

Case History #

Tissue Collection #

Water Hardness

BELOW TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2A1	428	874	1.115	N	N	S&L	0	0	G	0	S	A	3	F	51	1	5.55	0	0				parasites/hindgut, hooks in mouth/side
2A2	440	873	1.025	OT	F	L	0	0	G	0	N	A	0	F	58	1	4.2	2	0				opaque eye
2A3	415	614	0.859	N	N	L	0	0	B	0	N	A	3	F	69	1	4.93	0	1				
2A4	445	1092	1.239	N	N	L	0	1	G	0	N	A	0	M	39	1	4.33	0	0				kidney hemmrhg from electroshock
2A5	475	1333	1.244	N	N	L	0	1	G	0	N	A	2	F	46	1	8.86	0	0				
2A6	452	1108	1.200	N	N	S&L	0	2	B	0	U	A	0	F	55	1	10.1	0	0				parasites in hindgut
2A7	464	1155	1.156	N	C	L	0	0	G	0	S	A	0	F	55	2	8.38	1	1				
2A8	458	958	0.997	N	N	L	0	0	B	0	N	A	0	M	66	1	5.84	0	0				
2A9	450	1129	1.239	N	N	S	0	0	B	0	N	A	0	M	58	1	6.13	0	0				
2A10	433	693	0.854	N	N	L	0	0	B	0	N	A	3	F	49	1	3.96	0	0				broken maxillary, hook, parasites/gut
2A11	433	1019	1.255	N	C	L	0	0	B	0	N	B	3	F	7	1	3.38	2	0				jaw damaged
2A12	438	922	1.097	N	C	N	0	1	B	0	N	B	0	M	39	2	4.4	0	0				
2A13	455	1058	1.123	N	N	L	0	0	B	0	S	A	0	F	32	2	6.72	0	0				lesion on abdomen
2A14	425	656	0.855	N	OT	L	2	0	B	0	S	A	0	F	57	2	5.25	0	0				shortened gills, 2 hooks on abdomen
2A15	437	743	0.890	B1	N	N	0	1	B	0	S	A	2	F	32	1.5	5.18	0	0				
2A16	430	871	1.096	N	N	S	0	1	B	0	S	B	0	F	34	1	4.73	0	0				parasites in hindgut
2A17	421	773	1.036	B1	N	S	0	0	B	0	N	A	3	F	34	1	6.23	0	0				
2A18	422	897	1.194	N	N	S&L	0	1	NO	0	N	A	0	F	39	1	6.61	0	0				damaged jaw, fish line/gut, parasite/gut
2A19	424	880	1.154	E2	N	L	1	0	B	0	S	A	2	M	45	1	6.1	1	0				gall bladder extremely distended
2A20	473	1208	1.142	N	C	S&L	0	1	B	0	N	B	1	F	50	1	8.47	1	0				
2A21	444	873	0.997	N	N	L	0	0	B	0	N	A	0	M	56	1	5.13	1	0				parasites in hindgut
2A22	407	756	1.121	N	N	L	1	2	B	0	N	A	1	F	39	1	5.2	1	0				damaged jaw
2A23	389	549	0.933	N	OT	L	0	1	B	0	N	A	0	F	53	1	6.66	0	0				gills short/missing, grwth on inner oprcle
2A24	412	717	1.025	OT	N	S&L	0	0	B	0	S	A	0	F	48	1	6.73	0	0				reduced pupil
2A25	474	668	0.627	N	C	L	1	1	G	0	N	A	0	F	39	1	5.76	0	0				
2A26	442	1053	1.219	N	N	S&L	0	1	B	0	N	A	0	M	48	1	5.71	0	0				fish line from lower intestine
2A27	430	1084	1.363	N	M	L	1	2	G	0	N	A	0	F	34	1	6.08	0	0				parasites in hindgut
2A28	467	1233	1.211	N	N	S&L	0	0	B	0	S	B	2	F	28	1	4.7	0	0				crater in liver, enlarged kidney
2A29	442	988	1.144	N	C	L	0	1	NO	0	S	A	0	F	25	1	7.57	0	0				extremely swollen kidney, parasites/gut
2A30	432	916	1.136	N	N	N	0	1	B	0	N	A	0	M	44	1	6.09	0	0				damaged jaw

General Remarks

Fins

Gonads several females were gravid, but notations were not made

Skin one fish w/lesion on abdomen

Other 8 fish with damage from anglers

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	1SJ2B
Species:	RT	Necropsy Date:	October 25, 2000	Sample Size:	23
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	FALL BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	176.2	38.10	269	122	21.6%
Weight (g)	67.7	34.2	140.0	22.0	50.4%
Ktl * 105	1.1747	0.21	1.4042	0.3687	17.7%
Ctl * 104	4.2443		5.0734	1.3322	
Hematocrit	43.455	6.25	60	33	14.4%
Leucocrit	1.045	0.21	2.0	1.0	20.4%
Plasma Protein	4.574	0.78	5.7	2.6	17.0%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 96%	N 100%	N 74%	0 43%	0 4%	B 30%	0 100%	N 96%	A	0 57%	0 96%	0 100%	N	N	N
B1	F	S	1 52%	1 43%	R 61%	1	S	B 100%	1 17%	1 4%	1	V	R	Pc
B2	C	L 26%	2 4%	2 22%	G 9%	2	M	C	2 9%	2	2	M	OP	Pl
E1	M	S&L	X 0.61	3 30%	NO	X 0	G	D	3 17%	X 4.35%	X	C	F	An
E2	P	I		4	E		U 4%	E	X 0.87			O	L	V
H1 4%	OT	OT		X 1.78	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		O
M2														OT
OT														

Summary of Normals

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
96%	100%	74%	43%		100%	100%	96%	100%		96%	100%			

Summary of Means

Thymus	Mesentery Fat	Hind Gut	Bile	Fins	Opercle	Mean deformities
.6 09	1.7 83	0	0.87	0.04		

Summary of Specific Percent Indices

Thymus	Mesentery Fat	Hind Gut	Bile	Fins	Opercle	Percent of possible
30.43%	44.6%	0%	29.0%	2.17%	0	

Summary of Combined Percent Indices

Normality index:	90.4	Severity Index:	8.15	Feeding Index:	71.0

Sex: M 48% F 48% U 4%

General Remarks

Fins

Skin 4 fish damaged by electroshocking

Gonads

Other wrong weight noted for 2B1??

File: 1SJ2B

Fish Necropcies

Wildlife Resources 11/99

Date 25-Oct-00 Unit ______ Species RT Strain ______ Quality Control # 15J2B

Location SAN JUAN RIVER Fish source ______ Age JUVENILE Case History # ______

Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______

Investigator(s) BOR/NMDGF Water temp C° ______ Water Hardness ______

Reason for necropsy: FALL BASELINE Code ___ Remarks BELOW TEXAS HOLE

Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2B1	289	89	0.369	N	N	N	1	3	R	0	N	B	0	F	60	2	5.68	0	0				** misnotation on weight???
2B2	168	63	1.329	N	N	N	0	1	B	0	U	B	0	F	47	1	2.63	1	0				
2B3	148	39	1.203	N	N	N	2	3	R	0	N	B	1	F	43	1	5.47	0	0				
2B4	127	25	1.220	N	N	N	1	1	R	0	N	B	1	M	51	1	4.86	0	0				
2B5	122	22	1.212	N	N	N	1	1	R	0	N	B	0	F			4.1	0	0				no hemotocrits, bleeding from electrosh
2B6	203	115	1.375	N	N	N	1	3	R	0	N	B	3	M	52	1	5.7	0	0				
2B7	197	92	1.203	H1	N	N	0	3	B	0	N	B	2	F	42	1	3.78	0	0				
2B8	178	68	1.206	N	N	N	0	3	R	0	N	B	0	M	46	1	4.9	0	0				
2B9	166	58	1.268	N	N	N	0	3	G	0	N	B	2	M	48	1	5.61	0	0				
2B10	183	69	1.126	N	N	L	0	3	B	0	N	B	3	M	43	1	4.87	0	0				
2B11	176	63	1.156	N	N	L	1	2	R	0	N	B	0	M	44	1	4.61	0	0				
2B12	154	41	1.123	N	N	N	1	1	B	0	N	B	1	F	38	1	4.41	0	0				
2B13	202	97	1.177	N	N	L	0	2	G	0	N	B	0	F	40	1	4.65	0	0				
2B14	158	36	0.913	N	N	N	0	1	R	0	N	B	3	M	43	1	4.5	0	0				
2B15	187	72	1.101	N	N	N	0	2	B	0	N	B	3	F	35	1	3.81	0	0				
2B16	130	23	1.047	N	N	N	1	0	R	0	N	B	1	F	35	1	3.59	0	0				
2B17	138	34	1.294	N	N	N	1	1	R	0	N	B	0	F	43	1	4.12	0	0				
2B18	198	109	1.404	N	N	L	1	1	R	0	N	B	0	M	40	1	4.76	0	0				external electro bruise
2B19	209	106	1.161	N	N	L	1	1	B	0	N	B	0	M	47	1	4.9	0	0				
2B20	200	106	1.325	N	N	L	1	1	R	0	N	B	0	F	47	1	5.44	0	0				external electro bruise
2B21	176	67	1.229	N	N	N	0	2	R	0	N	B	0	M	33	1	3.91	0	0				fresh hemorrhage from electroshock
2B22	218	140	1.351	N	N	N	1	2	B	0	N	B	0	M	42	1	5.07	0	0				
2B23	125	24	1.229	N	N	N	0	1	R	0	N	B	0	U	37	1	3.82	0	0				

General Remarks

Fins ______ Gonads ______

Skin 4 fish damaged by electroshocking Other wrong weight noted for 2B1??

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	2SJ1A
Species:	RT	Necropsy Date:	December 7, 2000	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	1st WINTER BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficent of Variance
Length (mm)	433.7	31.86	491	365	7.3%
Weight (g)	899.0	194.4	1320.0	550.0	21.6%
Ktl * 105	1.0884	0.09	1.3128	0.9521	8.7%
Ctl * 104	3.9323		4.7433	3.4401	
Hematocrit	41.333	9.13	68	18	22.1%
Leucocrit	1.117	0.25	2.0	1.0	22.6%
Plasma Protein	4.988	1.50	9.5	2.8	30.2%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesenteric Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 67%	N 77%	N 10%	0 77%	0 47%	B 40%	0 90%	N 67%	A 80%	0 47%	0 57%	0 90%	N	N	N
B1 13%	F 3%	S 60%	1 23%	1 40%	R 17%	1 10%	S 20%	B 13%	1 20%	1 37%	1 7%	V	R	Pc
B2	C 7%	L 7%	2	2 10%	G 30%	2	M	C	2 3%	2 7%	2 3%	M	OP	Pl
E1 7%	M 3%	S&L 20%	X 0.23	3 3%	NO 10%	X #####	G	D	3 30%	X #####	X 0.13	C	F	An
E2 3%	P	I 3%		4	E		U 13%	E 3%	X 1.17			O	L	V
H1 3%	OT 10%	OT		X 0.70	OT 3%		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT 7%														
					Summary of Normals									
67%	77%	10%	77%		67%	90%	67%	93%		57%	90%			
					Summary of Means							Mean deformities		
			.2 33	.7		0.10			1.17	0.50	0.13			
					Summary of Specific Percent Indices							Percent of possible		
			11.67%	17.5%		5.00%			38.9%	25.00%	6.67%			

		Summary of Combined Percent Indices			
Normality Index:	71.3	Severity Index:	12.08	Feeding Index:	61.1

Sex: M 30% F 70% U

General Remarks

Fins 2 fish w/fungus, 1 fish missing pectoral fin

Skin

Gonads 13 gravid, 5 post-spawn females, 1 male extruding milt

Other 11 fish with damage from anglers

File: 2SJ1A

Fish Necropcies

Wildlife Resources 11/99

Date 7-Dec-00 Unit ____ Species RT Strain ____

Location SAN JUAN RIVER Fish source ____ Age ADULT

Mark/lot ____ Egg source ____ Hatch date ____

Investigator(s) BOR/NMDGF Water temp C° ____

Reason for necropsy: 1st WINTER BASELINE Code ___ Remarks ____

Disease survey No: ____ Custody No ____

Quality Control # 2SJ1A

Case History # ____

Tissue Collection # ____

Water Hardness ____

DAM TO TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10⁵	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1A31	460	1091	1.121	N	N	S&L	0	1	B	0	S	A	3	F	30	1	3.72	0	0				gravid, parasites in hindgut
1A32	434	904	1.106	N	N	S	0	1	B	0	N	A	1	F	45	1	5.25	0	0				gravid, kidney swollen from shocking
1A33	450	974	1.069	N	N	S	0	1	G	0	N	A	3	F	44	1	4.44	1	1				egg resorption, jaw damaged
1A34	380	580	1.057	OT	F	S	0	0	B	0	N	A	0	F	43	1	4.65	2	0				grvd, cateyes, dmgd jaw/hook, parasites
1A35	470	991	0.955	N	C	S	0	0	B	0	N	A	0	F	43	1	4.17	1	0				spawned out
1A36	491	1133	0.957	OT	N	S	0	0	G	0	U	B	0	F	18	1	9.42	1	0				gravid, small pupils
1A37	431	815	1.018	N	N	S	1	0	G	1	N	A	0	M	53	1	5.16	1	1				hooked jaw, thymus slight, parasites
1A38	462	1049	1.064	N	N	S&L	0	0	B	0	S	A	1	F	28	1	5.48	0	0				gravid
1A39	445	1070	1.214	N	N	S&L	0	1	G	0	S	A	3	F	47	1	6.92	0	0				spawned out
1A40	462	997	1.011	N	N	S	0	1	G	0	N	A	0	F	46	1	3.39	0	0				gravid, parasites in hindgut
1A41	390	600	1.011	B1	OT	L	0	0	NO	0	N	A	0	F	41	1	4.83	1	0				gravid, gill/small discolor, parasites/gut
1A42	465	1108	1.102	E1	N	S&L	0	0	G	0	N	A	1	F	39	1.5	4.53	0	0				gravid, jaw damaged, parasites in gut
1A43	480	1053	0.952	E2	N	S&L	0	0	B	1	N	B	3	M	36	1	5.49	1	0				damaged jaw
1A44	432	842	1.044	B1	N	L	0	1	B	0	N	A	3	M	68	1.5	3.72	0	0				deformed eye, damaged jaw
1A45	411	803	1.157	H1	N	S	0	1	G	0	N	A	0	F	49	1	3.83	0	0				gravid, scoliosis
1A46	365	591	1.215	N	N	S	1	2	G	0	U	A	1	M	48	1	3.69	0	0				parasites in hindgut
1A47	431	935	1.168	N	N	S	0	0	B	0	N	A	2	F	46	1	9.54	0	0				gravid, dmgd jaw, parasites in hindgut
1A48	410	833	1.209	N	N	S	1	2	B	0	U	A	1	M	39	1	4.92	1	0				
1A49	430	819	1.030	N	OT	I	1	3	NO	0	N	A	3	M	37	2	5.12	0	0				discolored gills, jaw damaged
1A50	396	723	1.164	N	C	S	1	1	R	0	N	A	0	M	48	1.5	4.13	1	0				parasites in hindgut
1A51	410	679	0.985	E1	N	S	0	0	B	0	N	E	0	F	42	1	4.71	1	0				gravid, parasites in hindgut
1A52	441	837	0.976	B1	N	S&L	0	0	B	1	S	A	3	M	44	1	4.09	0	0				distorted jaw, parasites/gut, extrd. milt
1A53	471	1212	1.160	N	N	N	0	1	B	0	S	B	0	F	27	1.5	5.71	0	0				gravid, damaged jaw
1A54	420	835	1.127	N	N	S	1	2	R	0	U	A	0	F	38	1	5.64	0	0				slight gill discoloration, young fish
1A55	429	892	1.130	B1	N	S	0	0	NO	0	N	NO	1	F	45	1	3.56	1	0				post-spawn, fungus on caudal fin
1A56	385	550	0.964	N	N	N	0	0	R	0	N	B	3	F	30	1	5.35	2	0				hook in mouth
1A57	465	1320	1.313	N	M	S	0	1	OT	0	N	A	3	F	47	1.5	4.94	1	0				gravid, spleen brown, fungus on fins
1A58	455	1001	1.063	N	OT	S	1	1	G	0	N	A	0	M	41	1	2.8	0	0				gill split
1A59	437	1020	1.222	N	N	S	0	0	R	0	S	A	0	F	38	1	4.76	0	0				post-spawn, eggs loose, parasites/gut
1A60	403	712	1.088	N	N	N	0	1	R	0	N	A	0	F	40	1	5.87	0	2				missing pectoral fin

General Remarks

Fins 2 fish w/fungus, 1 fish missing pectoral fin

Gonads 13 gravid, 5 post-spawn females, 1 male extruding milt

Skin ____

Other 11 fish with damage from anglers

Summary of Necropsies

Location: SAN JUAN RIVER

Quality Control No.: 2SJ1B

Species:	RT	Necropsy Date:	December 7, 2000	Sample Size:	30
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	1st WINTER BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	170.2	25.64	220	131	15.1%
Weight (g)	61.9	32.0	143.0	24.0	51.8%
KtI * 10^5	1.1527	0.11	1.3757	0.9400	9.9%
CtI * 10^4	4.1648		4.9703	3.4280	
Hematocrit	40.852	5.73	51	29	14.0%
Leucocrit	1.212	0.38	2.0	1.0	31.3%
Plasma Protein	5.171	1.09	8.2	3.3	21.1%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 100%	N 93%	N 67%	0 33%	0 7%	B 10%	0 100%	N 100%	A 20%	0 30%	0 100%	0 93%	N	N	N
B1	F 3%	S 7%	1 63%	1 70%	R 80%	1	S	B 73%	1 50%	1	1 3%	V	R	Pc
B2	C	L 20%	2 3%	2 10%	G 7%	2	M	C 7%	2 13%	2	2 3%	M	OP	Pl
E1	M	S&L 7%	X 0.70	3 13%	NO 3%	X 0	G	D	3 7%	X 0	X 0.10	C	F	An
E2	P 3%	I		4	E		U	E	X 0.97			O	L	V
H1	OT	OT		X 1.30	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														

Summary of Normals

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
100%	93%	67%	33%		87%	100%	100%	93%		100%	93%			

Summary of Means

Thymus	Mesentery Fat	Hind Gut	Bile	Fins	Opercle	Mean deformities
.7	1.3	0	0.97	0	0.10	

Summary of Specific Percent Indices

Thymus	Mesentery Fat	Hind Gut	Bile	Fins	Opercle	Percent of possible
35.00%	32.5%	0%	32.2%	0%	5.00%	

Summary of Combined Percent Indices

Normality index:	87.7	Severity Index:	10.00	Feeding Index:	67.8

Sex: M 30% F 40% U 30%

General Remarks

Fins

Skin one fish w/lesion on abdomen

Gonads

Other one fish w/electroshock bruise

File: 2SJ1B

Fish Necropcies

Wildlife Resources 11/99

Date 7-Dec-00 Unit ______ Species RT Strain ______ Quality Control # 25J1B

Location SAN JUAN RIVER Fish source ______ Age JUVENILE Case History # ______

Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______

Investigator(s) BOR/NMDGF Water temp C° ______ Water Hardness ______

Reason for necropsy: 1st WINTER BASELINE Code ___ Remarks DAM TO TEXAS HOLE

Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1B31	164	51	1.156	N	N	N	1	1	G	0	N	B	1	F	44	2	3.45	0	0				
1B32	164	60	1.360	N	N	N	0	1	R	0	N	B	1	M	44	2	4.88	0	0				
1B33	162	51	1.200	N	N	N	0	3	R	0	N	B	2	M	47	1	5.09	0	0				
1B34	135	26	1.057	N	P	N	0	1	R	0	N	C	2	U	31	1	6.21	0	0				
1B35	174	53	1.006	N	N	S	1	1	B	0	N	B	2	F	47	1	4.77	0	1				small black spots on gills - parasites?
1B36	185	70	1.106	N	N	N	1	3	B	0	N	B	0	U	46	1	5.75	0	0				
1B37	171	62	1.240	N	F	L	1	1	R	0	N	B	1	F	48	1	6.42	0	0				
1B38	217	114	1.116	N	N	N	2	1	R	0	N	B	0	U	34	1.5	6.3	0	0				
1B39	165	47	1.046	N	N	N	1	0	R	0	N	B	1	F	37	2		0	0				
1B40	220	143	1.343	N	N	N	1	3	G	0	N	B	1	F	37	1	4.1	0	0				
1B41	191	82	1.177	N	N	N	1	3	R	0	N	B	2	F	50	1	5.03	0	0				
1B42	135	26	1.057	N	N	L	0	1	R	0	N	B	1	M			5.28	0	0				no blood for hematocrits
1B43	181	70	1.180	N	N	S&L	1	2	R	0	N	B	0	M	48	1.5	3.32	0	0				
1B44	161	48	1.150	N	N	L	1	1	R	0	N	B	1	F	43	1	4.79	0	0				
1B45	168	45	0.949	N	N	N	0	0	R	0	N	B	1	M	36	2	6.94	0	0				
1B46	155	48	1.289	N	N	S&L	0	1	R	0	N	C	3	F	36	1	5.32	0	0				electroshock bruise, lesion on abdomen
1B47	218	130	1.255	N	N	L	1	1	R	0	N	B	0	M	36	1	5.99	0	0				
1B48	186	79	1.228	N	N	S	1	1	R	0	N	B	0	F	40	1	4	0	0				
1B49	136	25	0.994	N	N	N	1	1	R	0	N	B	1	U	36	1	5.35	0	0				
1B50	142	31	1.083	N	N	N	0	1	R	0	N	B	1	U			4.71	0	2				no blood for hematocrits
1B51	131	24	1.068	N	N	N	0	1	R	0	N	A	1	U	29		4.91	0	0				no leucocrit recorded
1B52	155	38	1.020	N	N	N	1	1	NO	0	N	B	1	M	36	1	3.91	0	0				
1B53	196	86	1.142	N	N	N	1	1	R	0	N	A	1	M	51	1	4.76	0	0				
1B54	156	41	1.080	N	N	N	1	1	R	0	N	A	1	F	43	1	6.18	0	0				
1B55	156	47	1.238	N	N	N	1	1	R	0	N	B	0	U	44	1.5	4.46	0	0				
1B56	199	89	1.129	N	N	L	1	1	R	0	N	B	0	U	45	1	4.98	0	0				
1B57	209	122	1.336	N	N	N	1	1	R	0	N	A	0	M	40	1	4.58	0	0				
1B58	172	70	1.376	N	N	N	0	2	R	0	N	A	0	F	38	1	6.67	0	0				
1B59	140	30	1.093	N	N	N	0	1	R	0	N	B	1	U	42	1	4.65	0	0				
1B60	163	48	1.108	N	N	L	1	2	B	0	N	A	3	F				0	0				no blood for hematocrits

General Remarks

Fins ______ Gonads ______

Skin one fish w/lesion on abdomen Other one fish w/electroshock bruise

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	2SJ2A
Species:	RT	Necropsy Date:	December 6, 2000	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	1st WINTER BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	439.4	27.45	525	378	6.2%
Weight (g)	924.6	180.0	1529.0	660.0	19.5%
Ktl * 105	1.0842	0.12	1.2790	0.8045	10.8%
Ctl * 104	3.0172		4.6210	2.5067	
Hematocrit	37.633	6.22	50	24	16.5%
Leucocrit	1.233	0.41	2.0	1.0	33.2%
Plasma Protein	5.003	1.14	8.2	3.5	22.8%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 77%	N 93%	N 10%	0 83%	0 50%	B 57%	0 97%	N 73%	A 90%	0 70%	0 70%	0 90%	N	N	N
B1 13%	F	S 70%	1 17%	1 37%	R 20%	1 3%	S 27%	B 3%	1 13%	1 27%	1 10%	V	R	Pc
B2 3%	C 3%	L 13%	2	2 10%	G 17%	2	M	C	2 7%	2 3%	2	M	OP	Pl
E1 3%	M	S&L 7%	X 0.17	3 3%	NO 7%	X 3.33%	G	D 3%	3 10%	X #####	X 0.10	C	F	An
E2 3%	P	I		4	E		U	E	X 0.57			O	L	V
H1	OT 3%	OT		X 0.67	OT		OT	F				F	T	C
H2								OT 3%				R	OT	Ad
M1												OT		D
M2														OT
OT														
Summary of Normals														
77%	93%	10%	83%		53%	97%	73%	93%		70%	90%			
Summary of Means												**Mean deformities**		
			.167	.667		0.03			0.57	0.33	0.10			
Summary of Specific Percent Indices												**Percent of possible**		
			8.33%	16.7%		1.67%			19.0%	16.67%	5.00%			

Summary of Combined Percent Indices

Normality index:	78.0	Severity Index:	7.02	Feeding Index:	81.1

Sex: M 43% F 57% U

General Remarks

Fins 2 fish missing 1 pectoral fin, 1 deformed pect.

Skin one fish w/lesion on abdomen

Gonads females - 6 gravid, 10 post-spawned; males - 3 extruding milt

Other 4 fish with damage from anglers

File: 2SJ2A

Fish Necropsies

Wildlife Resources 11/99

Date 8-Dec-00 Unit ______ Species RT Strain ______

Location SAN JUAN RIVER Fish source ______ Age ADULT

Mark/lot ______ Egg source ______ Hatch date ______

Investigator(s) BOR/NMDGF Water temp C^0 ______

Reason for necropsy: 1st WINTER BASELINE Code __ Remarks ______

Disease survey No: ______ Custody No ______

Quality Control # 2SJ2A

Case History # ______

Tissue Collection # ______

Water Hardness ______

BELOW TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle Deformities	Skin lesions	Fin Deformities	Remarks
2A31	464	1140	1.141	N	N	S	1	1	B	0	S	A	1	M	33	1	4.12	0	1			parasites/gut, electro damage on kidney
2A32	463	967	0.974	N	N	S	0	0	B	0	N	A	3	M	40	1	5.43	1	0			parasites in gut
2A33	486	1053	0.917	B1	N	S	0	1	B	0	S	A	0	F	24	1	4.8	0	0			
2A34	420	866	1.169	N	N	S	0	0	B	0	N	A	3	F	38	1.5	5.13	1	0			post-spawn, parasites/gut, damgd jaw
2A35	446	958	1.080	N	N	S	0	0	B	0	N	A	0	M	44	1	3.78	0	0			extruding milt, parasites in gut
2A36	425	968	1.261	N	N	S	0	1	NO	0	S	D	0	F	39	1	7.64	0	0			post-spawn, damgd jaw, nodules in liver
2A37	428	906	1.156	N	N	S	0	0	B	0	N	A	3	F	32	1	5.31	0	0			gravid, parasites in gut
2A38	442	899	1.041	N	N	L	1	3	R	0	N	A	0	M	35	1.5	4.76	1	0			
2A39	458	860	0.895	N	N	S&L	0	0	G	1	N	A	1	F	24	2	4.35	1	0			resorbed eggs
2A40	413	795	1.129	B2	N	S	0	0	B	0	N	A	0	F	43	1	4.58	1	0			gravid
2A41	458	1080	1.124	N	N	S	0	0	B	0	S	A	2	M	38	1	4.58	1	0			extruding milt
2A42	440	1006	1.181	N	N	S	0	1	B	0	N	A	0	F	27	1	4.23	0	0			gravid, dfrmed back & jaw, enlrged liver
2A43	525	1529	1.057	N	N	S	0	1	NO	0	N	A	2	M	34	1	4.47	0	0			damaged jaw, parasites in gut
2A44	448	1150	1.279	N	N	S	0	0	R	0	S	A	0	F	35	1	3.52	0	0			gravid
2A45	465	1096	1.090	N	N	S	0	1	B	0	N	A	0	F	39	1	4.9	0	0			gravid
2A46	376	660	1.222	N	N	S	1	2	G	0	S	A	0	M	35	1	4.92	0	0			parasites in gut, small pseudobranchs
2A47	425	842	1.097	N	N	N	1	2	B	0	N	A	0	M	42	1	5.7	0	0			kidney damaged from electroshock
2A48	443	936	1.077	N	C	S	0	0	R	0	N	A	0	M	42	1	4.96	1	0			milting, parasites, skin lesion/abdomen
2A49	437	794	0.951	N	N	S	0	0	R	0	N	A	0	M	49	2	4.07	0	0			right pectoral missing
2A50	420	876	1.182	N	N	S	0	0	B	0	N	A	0	F	50	2	6.67	0	0			post-spawn, parasites in gut
2A51	466	1105	1.092	E1	N	S&L	1	1	B	0	N	A	1	F	40	1	4.85	0	0			post-spawn, parasites in gut
2A52	438	716	0.852	E2	N	S	0	0	G	0	N	B	0	F	38	1	5.24	0	0			post-spawn
2A53	428	926	1.181	N	N	N	0	1	R	0	N	A	0	M	42	1	4.46	0	1			missing 1 pectoral, other is deformed
2A54	417	838	1.156	N	N	S	0	1	B	0	N	A	1	M	42	1	4.03	0	0			parasites in gut
2A55	406	703	1.050	N	N	L	0	1	G	0	N	A	0	F	35	1	5.53	0	0			post-spawn
2A56	435	987	1.199	N	N	N	0	2	G	0	N	A	0	F	33	2	8.22	0	0			post-spawn, parasites, swollen jaw
2A57	436	948	1.128	N	OT	L	0	0	B	0	N	A	0	F	41	1	7.45	0	0			post-spawn, gill discoloration
2A58	423	727	0.961	B1	N	S	0	1	B	0	N	A	0	F	40	2	3.88	2	0			gravid, parasites in gut
2A59	441	690	0.805	B1	N	S	0	0	B	0	S	OT	0	F	43	2	4.52	1	1			liver w/film & mottling, parasites, postsp
2A60	405	717	1.079	B1	N	L	0	0	R	0	S	A	0	M	32	1	4.05	0	0			

General Remarks

Fins 2 fish missing 1 pectoral fin, 1 deformed pect.

Gonads females - 6 gravid, 10 post-spawned; males - 3 extruding milt

Skin one fish w/lesion on abdomen

Other 4 fish with damage from anglers

Summary of Necropsies

Location: SAN JUAN RIVER | Quality Control No.: 2SJ2B

Species:	RT	Necropsy Date:	December 8, 2000	Sample Size:	26
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	1st WINTER BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	166.0	32.75	243	120	19.6%
Weight (g)	62.0	42.0	172.0	18.0	67.9%
Ktl * 105	1.1616	0.11	1.4777	0.9334	9.3%
Ctl * 104	4.1960		5.3301	3.3722	
Hematocrit	40.077	8.59	61	21	21.4%
Leucocrit	1.100	0.29	2.0	1.0	26.2%
Plasma Protein	4.676	1.27	8.2	2.8	27.3%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 100%	N 96%	N 77%	0 38%	0 4%	B 31%	0 100%	N 100%	A 35%	0 69%	0 92%	0 100%	N	N	N
B1	F 4%	S 19%	1 62%	1 62%	R 62%	1	S	B 65%	1 19%	1 8%	1	V	R	Pc
B2	C	L 4%	2	2 23%	G 8%	2	M	C	2 8%	2	2	M	OP	Pi
E1	M	S&L	X 0.62	3 12%	NO	X 0	G	D	3 4%	X 7.69%	X	C	F	An
E2	P	I		4	E		U	E	X 0.46			O	L	V
H1	OT	OT		X 1.42	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														
					Summary of Normals									
100%	96%	77%	38%		100%	100%	100%	100%		92%	100%			
					Summary of Means							Mean deformities		
			.6 15	1.4 23		0			0.46	0.08				
					Summary of Specific Percent Indices							Percent of possible		
			30.77%	35.6%		0%			15.4%	3.85%	0			

Summary of Combined Percent Indices

Normality Index: 90.4	Severity Index: 6.65	Feeding Index: 84.6

Sex: M 38% F 50% U 12%

General Remarks

Fins

Skin

Gonads

Other one fish dense tissue bulge on back, one fish w/spinal deformity

File: 2SJ2B

Fish Necropcies

Wildlife Resources 11/99

Date 8-Dec-00 Unit ______ Species RT Strain ______ Quality Control # 2SJ2B
Location SAN JUAN RIVER Fish source ______ Age JUVENILE Case History # ______
Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______
Investigator(s) BOR/NMDGF Water temp C° ______ Water Hardness ______
Reason for necropsy: 1st WINTER BASELINE Code ___ Remarks ______ BELOW TEXAS HOLE
Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2B31	243	172	1.199	N	N	S	1	1	R	0	N	A	0	F	43	1	6.29	0	0				
2B32	160	49	1.196	N	N	N	0	1	B	0	N	B	0	U	47	1	3.95	0	0				
2B33	161	46	1.102	N	N	N	1	2	B	0	N	B	1	F	47	2	4.49	0	0				
2B34	161	47	1.126	N	N	N	1	1	B	0	N	A	1	F	50	1	7.66	0	0				
2B35	155	45	1.208	N	F	N	1	1	R	0	N	B	0	F	40	1	5.55	0	0				one gill arch shortened
2B36	143	34	1.163	N	N	N	1	1	R	0	N	A	0	U	38	1	3.48	0	0				
2B37	200	104	1.300	N	N	N	1	2	R	0	N	A	0	M	39	1	5.81	0	0				
2B38	213	111	1.149	N	N	N	1	1	G	0	N	A	0	F	28	2	4.32	0	0				light-colored pseudobranchs
2B39	158	40	1.014	N	N	N	0	1	R	0	N	B	2	M	45		4.54	0	0				leucocrit not read
2B40	215	119	1.197	N	N	N	1	2	R	0	N	A	1	M	34	1	3.69	0	0				crooked jaw
2B41	217	151	1.478	N	N	S	0	0	B	0	N	A	3	M	21	1	3.89	0	0				dnse tissue bulge on back/no spine dfrm
2B42	183	77	1.256	N	N	N	1	1	R	0	N	B	0	M	37	1	4.37	0	0				
2B43	213	118	1.221	N	N	N	1	3	R	0	N	A	2	F	42	1	4.25	1	0				
2B44	166	51	1.115	N	N	N	1	1	R	0	N	B	0	M	47	1	3.99	0	0				
2B45	194	86	1.178	N	N	N	0	2	G	0	N	B	0	F	31	1	4.43	0	0				spinal misalignment/lrg bulge on back
2B46	165	53	1.180	N	N	N	1	1	R	0	N	B	0	M	39	1	4.72	0	0				
2B47	148	33	1.018	N	N	N	0	2	B	0	N	B	1	M	33	1.5	4.05	1	0				
2B48	140	33	1.203	N	N	N	1	1	R	0	N	B	0	F	30	1	4.53	0	0				
2B49	156	45	1.185	N	N	S	1	1	R	0	N	B	0	F	44	1	3.54	0	0				
2B50	120	18	1.042	N	N	S	0	1	B	0	N	B	0	U	39	1	3.13	0	0				not enough blood for protein
2B51	140	32	1.166	N	N	S	1	1	B	0	N	B	0	F	50	1	5.62	0	0				
2B52	135	31	1.260	N	N	N	0	1	R	0	N	B	0	F	61	1	8.24	0	0				dark blotches on operacles
2B53	157	42	1.085	N	N	N	0	2	R	0	N	B	0	F	41	1	4.53	0	0				
2B54	137	24	0.933	N	N	L	0	1	B	0	N	A	0	M	50	1	4.88	0	0				no blood for protein, pseud small lthic
2B55	137	31	1.206	N	N	N	1	3	R	0	N	B	0	F	36	1	2.79	0	0				
2B56	123	19	1.021	N	N	N	0	3	R	0	N	B	1	M	30	1	4.7	0	0				not enough blood for protein

General Remarks

Fins ______ Gonads ______
Skin ______ Other one fish dense tissue bulge on back, one fish w/spinal deformaty

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	3SJ1A
Species:	RT	Necropsy Date:	January 30, 2001	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	2nd WINTER BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	437.5	33.02	485	358	7.5%
Weight (g)	852.6	175.1	1250.0	487.0	20.5%
Ktl * 105	1.0107	0.11	1.2043	0.7697	11.3%
Ctl * 104	3.6518		4.3510	2.7809	
Hematocrit	38.400	7.14	54	26	18.6%
Leucocrit	1.167	0.30	2.0	1.0	26.0%
Plasma Protein	4.360	1.10	8.2	1.4	25.3%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesenteric Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 73%	N 77%	N 23%	0 93%	0 60%	B 23%	0 93%	N 97%	A 77%	0 45%	0 93%	0 87%	N	N	N
B1 20%	F 17%	S 47%	1 7%	1 27%	R 33%	1 7%	S 3%	B 10%	1 14%	1 3%	1 10%	V	R	Pc
B2	C 7%	L 10%	2	2 7%	G 33%	2	M	C 3%	2 10%	2 3%	2 3%	M	OP	Pl
E1 3%	M	S&L 17%	X 0.07	3 7%	NO 10%	X 6.67%	G	D	3 28%	X #####	X 0.17	C	F	An
E2	P	I 3%		4	E		U	E 3%	X 1.21			O	L	V
H1 3%	OT	OT		X 0.60	OT		OT	F 7%				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														
					Summary of Normals									
73%	77%	23%	93%		90%	93%	97%	87%		93%	87%			
					Summary of Means							Mean deformities		
			.067	.6		0.07			1.21	0.11	0.17			
					Summary of Specific Percent Indices							Percent of possible		
			3.33%	15.0%		3.33%			40.5%	5.56%	8.33%			

Summary of Combined Percent Indices

Normality index:	81.3	Severity Index:	5.14	Feeding Index:	59.5

Sex: M 20% F 80% U

General Remarks

Fins: one deformed pectoral, 2 w/fungus on fins

Skin

Gonads: females - 5 gravid, 5 post-spawn, males - 1 extruding milt

Other: 4 fish with damage from anglers

File: 3SJ1A

Fish Necropcies

Wildlife Resources 11/99

Date 30-Jan-01 Unit Species RT Strain

Quality Control # 35J1A

Location SAN JUAN RIVER Fish source Age ADULT

Case History #

Mark/lot Egg source Hatch date

Tissue Collection #

Investigator(s) BOR/NMDGF Water temp C°

Water Hardness

Reason for necropsy: 2nd WINTER BASELINE Code Remarks DAM TO TEXAS HOLE

Disease survey No: Custody No

Sample Number	Length mm	Weight g	KTL * 10⁵	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leukocrit	Plasma Protein	Fins	Opercle Deformities	Skin lesions	Fin Deformities	Remarks
1A61	442	987	1.143	N	N	S&L	0	0	B	0	N	A	O	F	29	1	3.99	0	0			
1A62	358	517	1.127	H1	F	S	0	3	G	0	N	A	3	F	38	1.5	4.6	0	0			deformed pect fin, parasites in gut
1A63	440	880	1.033	N	N	I	0	1	R	0	N	A	0	F	32	1	4.36	0	0			
1A64	480	984	0.890	N	C	S&L	0	0	G	0	N	A	2	F	48	2	4.73	0	2			clubbed gills
1A65	452	1095	1.186	N	N	S	0	0	R	0	N	A	0	M	45	1	5.78	0	0			psbr also inflamed, parasites, milting
1A66	429	930	1.178	B1	C	S	0	0	B	1	S	A	3	F	48	1.5	8.16	0	0			loose eggs, fungus on fins and eyes
1A67	452	811	0.878	N	N	S&L	0	0	NO	0	N	C	0	F	43	1.5	2.68	0	0			
1A68	444	755	0.863	B1	F	N	0	0	G	0	N	B	0	F	37	1	4.2	0	0			post-spawn
1A69	481	1250	1.123	N	N	L	0	0	G	0	N	A	0	M	43	1	3.84	0	0			damaged jaw
1A70	405	800	1.204	N	N	S&L	0	0	G	0	N	B		F	42	1	5.83	0	0			gravid, *bile was mismarked/no data
1A71	485	1111	0.974	B1	N	S	0	3	R	0	N	A	1	M	38	1	4.93	0	0			
1A72	474	1069	1.004	B1	N	S	0	0	B	0	N	F	0	F	36	1	4.73	0	0			post-spawn, fungus
1A73	450	914	1.003	N	F	N	0	0	B	0	N	A	1	F	28	1	4.22	0	0			gravid
1A74	462	759	0.770	N	F	S	0	0	NO	0	N	F	3	F	28	1	1.38	1	1			damaged jaw
1A75	426	830	1.074	N	N	S	0	0	R	0	N	A	3	M	31	2	3.15	0	0			
1A76	475	903	0.843	N	N	S	0	0	G	0	N	A	0	M	45	1	4.8	0	0			damaged jaw
1A77	411	783	1.128	N	F	L	0	2	B	0	N	A	1	F	41	1	4.21	0	1			parasites in gut
1A78	442	877	1.016	N	N	S	0	0	B	0	N	A	3	F	44	1	4.01	2	0			parasites in gut
1A79	359	487	1.053	N	N	N	1	2	R	0	N	A	1	F	49	1	4.92	0	1			
1A80	480	1032	0.933	B1	N	S&L	0	0	G	1	N	A	3	M	26	1	4.21	0	0			damaged jaw, parasites in gut
1A81	371	505	0.989	N	N	N	1	1	G	0	N	A	2	F	54	1.5	4.63	0	0			
1A82	445	887	1.007	N	N	S	0	1	G	0	N	A	0	F	38	1	4.46	0	0			
1A83	445	892	1.012	N	N	N	0	1	R	0	N	A	0	F	33	1	5.01	0	0			post spawn
1A84	421	725	0.972	N	N	S	0	0	G	0	N	A	0	F	32	1	4.14	0	0			post spawn
1A85	430	839	1.055	E1	N	S	0	1	R	0	N	A	2	F	35	1	4.04	0	0			post spawn, parasites in hind gut
1A86	424	848	1.112	N	N	L	0	0	R	0	N	E	3	F	41	1	4	0	0			gravid, parasites in gut
1A87	447	936	1.048	N	N	N	0	1	B	0	N	A	3	F	44	1	4.06	0	0			loose eggs
1A88	425	779	1.015	N	N	N	0	1	NO	0	N	A	0	F	39	1	4.11	0	0			damaged jaw
1A89	442	731	0.847	N	N	S	0	1	R	0	N	A	0	F	34	1.5	4.07	0	0			broken maxillary, gravid
1A90	428	663	0.846	B1	N	S	0	0	R	0	N	B	0	F	31	1.5	3.54	0	0			

General Remarks

Fins one deformed pectoral, 2 w/fungus on fins

Gonads females - 5 gravid, 5 post-spawn, males - 1 extruding milt

Skin

Other 6 fish with damage from anglers

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	3SJ1B
Species:	RT	Necropsy Date:	January 30, 2001	Sample Size:	30
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	2nd WINTER BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	192.5	28.75	239	146	14.9%
Weight (g)	82.9	38.0	157.0	30.0	45.8%
Ktl * 105	1.0862	0.12	1.3953	0.8387	11.2%
Ctl * 104	3.9244		5.0413	3.0301	
Hematocrit	40.600	6.19	54	31	15.2%
Leucocrit	1.200	0.36	2.0	1.0	30.2%
Plasma Protein	3.803	0.66	5.4	2.9	17.3%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesenteric Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 100%	N 100%	N 83%	0 50%	0 33%	B 23%	0 100%	N 97%	A 23%	0 33%	0 97%	0 97%	N	N	N
S1	F	S 13%	1 50%	1 50%	R 47%	1	S	B 77%	1 60%	1 3%	1 3%	V	R	Pc
S2	C	L 3%	2	2 7%	G 30%	2	M	C	2	2	2	M	OP	Pl
E1	M	S&L	X 0.50	3 10%	NO	X 0	G	D	3 7%	X 3.33%	X 0.03	C	F	An
E2	P	I		4	E		U	E	X 0.80			O	L	V
H1	OT	OT		X 0.93	OT		OT 3%	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														

	Eyes	Gills	Pseudobranchs	Thymus	Mesenteric Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
Summary of Normals	100%	100%	83%	50%		100%	100%	97%	100%		97%	97%			
Summary of Means				.5	.9 33		0			0.80	0.03	0.03	Mean deformities		
Summary of Specific Percent Indices				25.00%	23.3%		0%			26.7%	1.67%	1.67%	Percent of possible		

Summary of Combined Percent Indices

Normality index:	92.3	Severity Index:	7.08	Feeding Index:	73.3

Sex: M 47% F 47% U 7%

General Remarks

Fins

Skin

Gonads

Other

File: 3SJ1B

Fish Necropcies

Wildlife Resources 11/99

Date 30-Jan-01 Unit ______ Species RT Strain ______ Quality Control # 35J1B

Location SAN JUAN RIVER Fish source ______ Age JUVENILE Case History # ______

Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______

Investigator(s) BOR/NMDGF Water temp C° ______ Water Hardness ______

Reason for necropsy: 2nd WINTER BASELINE Code ___ Remarks ______ DAM TO TEXAS HOLE

Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities	Remarks
1B61	196	71	0.943	N	N	N	0	0	R	0	N	B	1	F	37	1.0	3.24	0	0				
1B62	195	89	1.200	N	N	N	1	0	G	0	N	B	0	F	40	2.0	4.12	0	0				
1B63	160	47	1.147	N	N	S	0	2	B	0	N	B	1	F	38	2.0	2.99	0	1				
1B64	146	30	0.964	N	N	S	1	3	G	0	N	B	0	M	40	1.0	4.19	0	0				
1B65	184	62	0.995	N	N	N	1	3	R	0	N	B	0	F	39	1.0	4.83	0	0				
1B66	231	128	1.038	N	N	N	0	1	R	0	N	A	1	M	48	1.0	4.61	0	0				
1B67	213	114	1.180	N	N	N	1	1	R	0	N	B	0	F	50	1.0	4.44	0	0				
1B68	210	100	1.080	N	N	N	0	0	R	0	N	A	0	F	54	1.0	4.92	0	0				
1B69	236	142	1.080	N	N	N	1	0	R	0	N	A	1	M	45	1.0	3.18	0	0				
1B70	172	71	1.395	N	N	N	1	0	R	0	N	B	1	F	31	1.0	3.29	0	0				
1B71	225	117	1.027	N	N	N	1	1	R	0	N	B	1	M	53	1.5	4.18	0	0				
1B72	209	82	0.898	N	N	N	1	2	G	0	N	B	1	M	39	1.0	2.92	0	0				
1B73	231	128	1.038	N	N	N	0	0	R	0	N	B	1	M	33	1.0	4.06	0	0				
1B74	180	59	1.012	N	N	N	0	1	B	0	N	B	0	F	37	2.0	3.21	0	0				
1B75	210	98	1.058	N	N	N	0	1	R	0	N	A	0	M	45	1.0	3.45	0	0				
1B76	239	154	1.128	N	N	N	0	0	B	0	N	B	3	F	45	1.0	5.35	0	0				
1B77	188	68	1.023	N	N	N	0	0	G	0	N	A	1	M	42	1.0	3.36	0	0				
1B78	194	80	1.096	N	N	S	0	3	R	0	N	B	1	M	48	2.0	3.96	0	0				
1B79	186	67	1.041	N	N	N	0	1	G	0	N	B	1	U	37	1.0	3.79	0	0				
1B80	234	157	1.225	N	N	N	1	1	B	0	N	A	0	F	48	1.0	4.59	0	0				
1B81	174	64	1.215	N	N	L	1	1	R	0	N	B	1	U	43	1.0	3.39	0	0				
1B82	198	87	1.121	N	N	N	1	1	R	0	N	B	1	M	40	1.0	4.27	0	0				
1B83	187	71	1.086	N	N	N	1	0	G	0	N	B	3	M	42	1.5	3.1	0	0				
1B84	176	58	1.064	N	N	N	1	1	G	0	N	B	0	F	37	1.0	3.53	0	0				
1B85	225	148	1.299	N	N	N	0	1	B	0	N	A	0	F	42	1.0	4.2	0	0				
1B86	150	42	1.244	N	N	S	1	1	G	0	N	B	1	M	31	1.5	3.56	1	0				
1B87	168	45	0.949	N	N	N	1	1	G	0	OT	B	1	F	31	1.5	2.9	0	0				node in kidney
1B88	147	32	1.007	N	N	N	0	1	R	0	N	B	1	M	37	1.0	3.39	0	0				
1B89	151	41	1.191	N	N	N	0	1	B	0	N	B	1	M	37	1.0	3.13	0	0				
1B90	161	35	0.839	N	N	N	0	0	R	0	N	B	1	F	35	1.0	3.95	0	0				

General Remarks

Fins ______ Gonads ______

Skin ______ Other ______

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	35J2A
Species:	RT	Necropsy Date:	January 31, 2001	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	2dn WINTER BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	415.0	34.28	495	359	8.3%
Weight (g)	802.5	190.3	1141.0	468.0	23.7%
Ktl * 105	1.1071	0.10	1.3030	0.8855	9.4%
Ctl * 104	3.9999		4.7077	3.1593	
Hematocrit	39.567	6.01	53	28	15.0%
Leucocrit	1.083	0.42	2.0		38.5%
Plasma Protein	4.466	1.14	7.6	2.0	25.6%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesenteric Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 87%	N 93%	N 23%	0 80%	0 30%	B 73%	0 97%	N 93%	A 83%	0 57%	0 93%	0 97%	N	N	N
B1 7%	F 3%	S 70%	1 20%	1 37%	R 13%	1 3%	S 7%	B 17%	1 17%	1	1 3%	V	R	Pc
B2	C	L 3%	2	2 27%	G 13%	2	M	C	2 13%	2 7%	2	M	OP	Pl
E1	M	S&L 3%	X 0.17	3 7%	NO	X 3.33%	G	D	3 13%	X #####	X 0.03	C	F	An
E2 3%	P	I		4	E		U	E	X 0.83			O	L	V
H1 3%	OT 3%	OT		X 1.10	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														
87%	93%	23%	80%		Summary of Normals 100%	97%	93%	100%		93%	97%			
			.172	1.1	Summary of Means	0.03			0.83	0.13	0.03	Mean deformities		
			8.62%	27.5%	Summary of Specific Percent Indices	1.67%			27.8%	6.67%	1.67%	Percent of possible		

Summary of Combined Percent Indices

Normality index:	86.3	Severity Index:	4.66	Feeding Index:	72.2

Sex: M 43% F 57% U

General Remarks

Fins one fish missing a pectoral fin

Skin

Gonads females - 7 gravid, 2 post-spawn

Other 6 fish with damage from anglers

File: 35J2A

Fish Necropcies

Wildlife Resources 11/99

Date 31-Jan-01 Unit ______ Species RT Strain ______

Location SAN JUAN RIVER Fish source ______ Age ADULT

Mark/lot ______ Egg source ______ Hatch date ______

Investigator(s) BOR/NMDGF Water temp C° ______

Reason for necropsy: 2dn WINTER BASELINE Code ___ Remarks ______

Disease survey No: ______ Custody No ______

Quality Control # 3SJ2A

Case History # ______

Tissue Collection # ______

Water Hardness ______

BELOW TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2A61	428	778	0.992	N	N	S	0	1	G	0	N	A	0	F	38	1	5.62	0	0				absorbing eggs
2A62	437	969	1.161	N	N	S	1	2	B	0	N	A	0	M	39	1	4.47	0	0				small spot on thymus
2A63	426	868	1.123	N	N	N	0	0	B	0	N	A	3	M	53	1.5	5.88	0	0				parasites in hind gut
2A64	436	984	1.187	N	N	S	0	1	B	0	N	A	3	F	38	1	4.61	0	0				gravid, parasites in hind gut
2A65	427	883	1.134	N	N	S	0	1	B	0	N	A	3	F	48	1	7.6	0	0				gravid, parasites in hind gut
2A66	460	1141	1.172	N	N	S&L	1	3	B	0	N	A	0	F	43	1	5.09	0	0				
2A67	416	830	1.153	N	N	L	0	2	B	0	N	A	0	F	41	1	7.14	0	0				missing pectoral, parasites in hind gut
2A68	370	660	1.303	N	N	N	1	3	B	0	N	A	2	F	45	1	4.41	0	0				
2A69	495	1074	0.886	B1	N	S	0	0	G	0	N	A	3	F	28	1	3.85	0	0				gravid, elctshck hmrrg, parasites/gut
2A70	467	950	0.933	N	N	S	0	0	G	0	N	A	0	F	41	1	3.82	2	0				absorbed eggs
2A71	445	1081	1.227	N	N	S	0	0	B	0	N	A	0	F	32	1	3.56	0	0				gravid
2A72	411	785	1.131	N	N	S	0	0	B	0	N	A	0	F	44	0	3.94	0	0				gravid
2A73	365	482	0.991	N	F	S	0	1	R	0	N	A	1	M	40	1	4.34	0	0				parasites in hind gut
2A74	449	1128	1.246	H1	N	S	0	1	B	1	S	B	2	M	30	1	4.11	0	0				
2A75	427	871	1.119	B1	N	S	0	0	R	0	N	A	0	F	32	1	3.25	0	0				gravid, small spot on kidney
2A76	450	926	1.016	N	N	N	0	0	B	0	N	B	2	F	31	0	1.96	0	0				gravid
2A77	368	565	1.134	N	N	N	0	2	B	0	N	A	0	M	41	1.5	5.04	0	0				broken maxillary
2A78	380	643	1.172	N	N	S	1	2	G	0	N	A	0	M	49	1.5	5.03	0	0				missing mandible
2A79	377	631	1.178	N	N	S	1	2	B	0	N	A	2	M	42	1.5	4.46	0	0				parasites in hind gut
2A80	393	705	1.161	N	N	S	0	1	B	0	N	A	1	M	39	1	4.65	2	0				parasites in hind gut
2A81	402	641	0.987	N	N	N	0	1	B	0	N	A	0	M	39	1	3.02	0	0				missing both maxillaries, parasites/gut
2A82	394	684	1.118	N	N	S	0	2	B	0	N	B	0	F	41	1	4.58	0	0				
2A83	423	954	1.260	N	DT	S	0	1	B	0	N	A	1	M	40	1	4.44	0	0				swollen gill arch with white spot
2A84	363	468	0.978	N	N	N	0	1	B	0	N	A	1	F	43	1	3.79	0	1				parasites in hind gut
2A85	390	588	0.991	N	N	S	0	1	R	0	N	B	1	F	30	1	4.47	0	0				damaged jaw, parasites in hind gut
2A86	448	916	1.019	E2	N	S	0	0	B	0	S	A	0	M	36	1	2.64	0	0				
2A87	417	785	1.083	N	N	S	0	1	B	0	N	A	0	F	43	1	4.1	0	0				broken maxillary
2A88	410	688	0.998	N	N	N	0	2	B	0	N	A	0	M	42	1.5	4.25	0	0				
2A89	418	869	1.190	N	N	S	0	0	B	0	N	A	0	M	48	2	5.21	0	0				broken maxillary, parasites in hind gut
2A90	359	541	1.169	N	N	S	1	2	R	0	N	B	0	F	43	2	4.65	0	0				gravel eater, parasites in hind gut

General Remarks

Fins one fish missing a pectoral fin

Gonads females - 7 gravid, 2 post-spawn

Skin ______

Other 6 fish with damage from anglers

Summary of Necropsies

Location: SAN JUAN RIVER

Quality Control No.: 35J2B

Species:	RT	Necropsy Date:	January 31, 2001	Sample Size:	30
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	2nd WINTER BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	175.8	35.18	260	125	20.0%
Weight (g)	65.0	44.8	206.0	20.0	68.9%
Ktl * 105	1.0409	0.09	1.1834	0.8382	8.5%
Ctl * 104	3.7608		4.2757	3.0284	
Hematocrit	38.172	4.73	52	29	12.4%
Leucocrit	1.121	0.39	2.0		35.1%
Plasma Protein	4.049	0.66	5.8	2.9	16.3%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Gut	Opercle	Deformities	Skin Lesions	Fin Deformities
N 97%	N 93%	N 83%	0 67%	0 17%	B 30%	0 100%	N 97%	A 27%	0 43%	0 97%	0 100%	N	N	N
B1	F	S 17%	1 33%	1 73%	R 57%	1	S 3%	B 73%	1 37%	1	1	V	R	Pc
B2	C 3%	L	2	2 10%	G 13%	2	M	C	2 17%	2 3%	2	M	OP	Pt
E1	M	S&L	X 0.33	3	NO	X 0	G	D	3 3%	X 6.67%	X	C	F	An
E2	P	I		4	E		U	E	X 0.80			O	L	V
H1	OT 3%	OT		X 0.93	OT		OT	F				F	T	C
H2 3%								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														

	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Gut	Opercle	Deformities	Skin Lesions	Fin Deformities
Summary of Normals	97%	93%	83%	67%		100%	100%	97%	100%		97%	100%			
Summary of Means				.3 33	.9 33		0			0.80	0.07		Mean deformities		
Summary of Specific Percent Indices				16.67%	23.3%		0%			26.7%	3.33%	0	Percent of possible		

Summary of Combined Percent Indices

Normality index:	93.3	Severity Index:	5.00	Feeding Index:	73.3

Sex: M 53% F 43% U 3%

General Remarks

Fins

Skin

Gonads

Other

File: 35J2B

Fish Necropcies

Wildlife Resources 11/99

Date 31-Jan-01 Unit Species RT Strain

Location SAN JUAN RIVER Fish source Age JUVENILE

Mark/lot Egg source Hatch date

Investigator(s) BOR/NMDGF Water temp C°

Reason for necropsy: 2nd WINTER BASELINE Code Remarks

Disease survey No: Custody No

Quality Control # 3SJ2B

Case History #

Tissue Collection #

Water Hardness

BELOW TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2B61	193	70	0.974	N	N	S	0	1	R	0	N	B	1	F	36	1	3.35	0	0				
2B62	205	101	1.172	N	N	N	0	1	B	0	S	B	2	M	29	2	3.3	0	0				
2B63	183	64	1.044	N	IOT	N	1	1	G	0	N	B	0	M	36	1.5	4.18	0	0				shortened gills
2B64	209	100	1.095	N	N	N	1	1	R	0	N	B	1	M	43	1	4.11	0	0				
2B65	184	69	1.108	N	N	N	0	1	B	0	N	B	0	M	30	2	4.49	0	0				whirling disease? short nose & caudal
2B66	187	71	1.086	N	N	N	0	0	R	0	N	A	0	U	41	2	4.64	0	0				
2B67	172	55	1.081	N	N	N	0	1	R	0	N	A	0	M	38	1	4.34	0	0				
2B68	211	94	1.001	N	N	N	1	1	B	0	N	A	3	F	42	1	3.71	0	0				
2B69	186	67	1.041	N	N	S	0	1	B	0	N	B	1	M	38	1	3.95	0	0				
2B70	183	56	0.914	N	N	N	1	0	B	0	N	A	2	M	38	1	3.93	0	0				
2B71	155	44	1.182	N	N	N	1	1	B	0	N	A	2	F				0	0				no plasma
2B72	155	39	1.047	N	N	N	1	1	G	0	N	B	2	F	39	1	4.44	0	0				
2B73	161	43	1.030	N	N	S	0	1	B	0	N	B	0	F	36	1	3.23	0	0				
2B74	146	31	0.996	N	N	N	0	1	B	0	N	B	0	M	39	1	2.89	0	0				
2B75	141	27	0.963	N	N	N	0	1	G	0	N	B	1	F	37	1	3.67	0	0				
2B76	138	26	0.989	N	N	N	0	2	R	0	N	B	1	F	35	1	4.03	0	0				
2B77	135	23	0.935	N	N	N	0	1	R	0	N	B	0	F	35	1	4.79	0	0				
2B78	181	62	1.046	N	N	N	1	1	R	0	N	A	0	M	40	1	4.81	0	0				
2B79	137	26	1.011	N	N	N	0	0	B	0	N	B	0	F	34	1	3.29	0	0				
2B80	192	68	0.961	N	N	N	1	0	R	0	N	B	1	M	39	0	3.96	2	0				
2B81	184	72	1.156	N	N	N	0	1	R	0	N	B	1	M	42	1.5	4.35	0	0				
2B82	241	161	1.150	N	N	N	0	2	R	0	N	A	1	F	52	1.5	5.41	0	0				
2B83	145	30	0.984	N	N	N	0	0	R	0	N	B	0	M	33	1	3.55	0	0				
2B84	214	98	1.000	N	N	N	1	1	R	0	N	B	2	M	43	1	5.75	0	0				
2B85	149	32	0.967	N	N	N	0	1	R	0	N	B	1	F	35	1	3.5	0	0				
2B86	142	24	0.838	N	N	N	0	1	R	0	N	B	0	F	33	1	3.49	0	0				
2B87	125	22	1.126	N	N	N	0	2	R	0	N	B	0	M	42	1	4.15	0	0				
2B88	233	148	1.170	H2	N	S	1	1	R	0	N	B	1	F	39	1	4.62	0	0				
2B89	127	20	0.976	N	C	S	0	1	R	0	N	B	1	M	37	1	3.58	0	0				
2B90	260	208	1.183	N	N	N	0	1	G	0	N	A	0	M	46	1	3.9	0	0				

General Remarks

Fins

Gonads

Skin

Other

Summary of Necropsies

Location: SAN JUAN RIVER

Quality Control No.: 4SJ1A

Species:	RT	Necropsy Date:	March 12, 2001	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	SPRING BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	431.8	38.16	488	343	8.8%
Weight (g)	807.5	155.5	1208.0	488.0	19.3%
Ktl * 105	1.0038	0.13	1.3479	0.6935	13.2%
Ctl * 104	3.6266		4.8700	2.5058	
Hematocrit	33.900	8.16	49	10	24.1%
Leucocrit	1.017	0.52	2.5		50.8%
Plasma Protein	4.552	1.13	7.4	2.2	24.9%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hindgut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 70%	N 87%	N 23%	0 83%	0 60%	B 53%	0 100%	N 90%	A 73%	0 80%	0 90%	0 93%	N	N	N
B1 13%	F 7%	S 70%	1 17%	1 33%	R 17%	1	S 7%	B 7%	1 10%	1 7%	1 7%	V	R	Pc
B2 3%	C	L	2	2 7%	G 17%	2	M	C 3%	2	2 3%	2	M	OP	Pl
E1 3%	M	S&L 3%	X 0.17	3	NO 10%	X 0	G	D	3 10%	X #####	X 0.07	C	F	An
E2 3%	P 3%	I 3%		4	E		U 3%	E 7%	X 0.40			O	L	V
H1	OT 3%	OT		X 0.47	OT 3%		OT	F 3%				F	T	C
H2								OT 7%				R	OT	Ad
M1												OT		D
M2														OT
OT 7%														
Summary of Normals														
70%	87%	23%	83%		87%	100%	90%	80%		90%	93%			
Summary of Means												Mean deformities		
			.167	.467		0			0.40	0.13	0.07			
Summary of Specific Percent Indices												Percent of possible		
			8.33%	11.7%		0%			13.3%	6.67%	3.33%			

Summary of Combined Percent Indices

Normality index: 80.3 | Severity Index: 4.58 | Feeding Index: 86.7

Sex: M 53% F 47% U

General Remarks

Fins 2 fins missing, 2 fins w/fungus, infection

Skin healed lesion on opercle

Gonads females - 3 gravid, 3 post-spawn

Other 16 fish w/damage from anglers, one w/scoliosis

File: 4SJ1A

Fish Necropcies

Wildlife Resources 11/99

Date 12-Mar-01 Unit ______ Species RT Strain ______

Location SAN JUAN RIVER Fish source ______ Age ADULT

Mark/lot ______ Egg source ______ Hatch date ______

Investigator(s) BOR/NMDGF Water temp C° ______

Reason for necropsy: SPRING BASELINE Code ___ Remarks ______

Disease survey No: ______ Custody No ______

Quality Control # 4SJ1A

Case History # ______

Tissue Collection # ______

Water Hardness ______

DAM TO TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1A91	410	929	1.348	B1	N	S	0	1	NO	0	N	A	0	M	35	1	4.71	0	0				
1A92	488	806	0.694	E2	N	S	0	0	B	0	N	F	1	M	20	1.5	2.2	0	0				damaged jaw
1A93	384	631	1.114	N	N	S	0	0	B	0	N	A	0	M	31	1	3.77	0	0				
1A94	466	875	0.865	OT	N	S	0	0	NO	0	N	B	0	M	37	1.5	4.26	0	0				mishaped pupils
1A95	485	1208	1.059	N	F	S&L	0	0	NO	0	N	E	0	F	26	1	4.73	0	0				post-spawn
1A96	426	826	1.068	OT	N	S	0	0	B	0	N	A	0	M	42	1.5	4.85	0	0				damaged jaw
1A97	460	911	0.936	N	F	S	0	1	B	0	N	A	0	M	34	1	6.01	1	0				parasites in hindgut
1A98	470	962	0.927	B1	N	S	0	0	B	0	N	A	3	F	32	1	6.61	0	0				gravid, damaged jaw, dorsal fin missing
1A99	430	820	1.031	N	N	S	0	0	B	0	N	A	0	F	29	1	7.39	0	0				gravid, damaged jaw, fungus on fins
1A100	441	841	0.981	N	N	N	0	0	G	0	N	A	0	M	33	0	4.34	0	0				
1A101	455	826	0.877	N	N	I	0	0	B	0	N	A	0	M	35	1	3.58	2	0				
1A102	448	827	0.920	N	N	S	0	1	B	0	S	A	0	M	18	1	3.35	0	1				
1A103	454	775	0.828	E1	N	S	0	1	B	0	N	A	0	F	35	1.5	4.71	0	0				post-spawn, scoliosis in spine
1A104	450	937	1.028	N	N	N	1	1	G	0	N	A	0	M	38	1	6.44	0	1				
1A105	440	914	1.073	N	N	N	0	0	R	0	N	A	0	M	35	1.5	3.26	0	0				deformed pectoral
1A106	446	770	0.868	N	P	S	0	0	OT	0	N	C	3	F	10	2.5	2.15	0	0				spln dscolred, stmch/jaw defrm, infct fin
1A107	401	719	1.115	N	N	N	0	1	G	0	N	A	0	F	40	1.5	4.5	1	0				damaged jaw
1A108	444	863	0.986	N	N	S	0	0	B	0	N	A	1	F	32	1	4.07	0	0				broken maxillary, hook in stomach
1A109	465	943	0.938	B1	N	S	0	0	G	0	N	A	0	F	32	0	4.14	0	0				damaged jaw
1A110	474	953	0.895	N	OT	S	0	1	G	0	N	A	3	M	26	1	4.52	0	0				gills dscolred, damaged jaw, hook in jaw
1A111	379	570	1.047	N	N	N	1	1	R	0	N	A	1	M	49	1	5.13	0	0				damaged jaw
1A112	343	498	1.234	N	N	S	1	1	B	0	N	A	0	F	42	0	4.49	0	0				healed lesion on operacle
1A113	409	657	0.960	N	N	N	0	0	B	0	N	A	0	F	31	1	4.8	0	0				
1A114	412	682	0.975	B1	N	S	0	0	R	0	N	A	0	M	43	1	3.83	0	0				dislocated jaw
1A115	346	488	1.178	N	N	S	0	2	R	0	U	A	0	M	39	1	4.98	0	0				maxillary missing
1A116	469	981	0.951	B2	N	S	0	0	R	0	S	E	0	M	40	1	4.1	0	0				large cataracts on both eyes
1A117	372	592	1.150	N	N	S	1	2	B	0	N	OT	0	F	45	0	5.06	0	0				jaws damaged, liver hemorg, parasites
1A118	435	768	0.933	N	N	S	0	0	B	0	N	B	0	F	33	1	4.26	0	0				post-spawn, fish line from vent
1A119	420	844	1.139	N	N	N	1	1	B	0	N	A	0	F	40	1	4.98	0	0				damaged jaw
1A120	433	808	0.995	N	N	S	0	0	B	0	N	OT	0	F	35	1	5.35	0	0				gravid, maxillary missng., liver hemor

General Remarks

Fins 2 fins missing, 2 fins w/fungus, infection

Gonads females - 3 gravid, 3 post-spawn

Skin healed lesion on opercle

Other 16 fish w/damage from anglers, one w/scoliosis

Summary of Necropsies

Location: SAN JUAN RIVER
Quality Control No.: 4SJ1B

Species:	RT	Necropsy Date:	March 12, 2001	Sample Size:	17
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	SPRING BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	197.2	40.35	258	132	20.5%
Weight (g)	93.2	57.6	190.0	24.0	61.9%
Ktl * 105	1.0613	0.09	1.1673	0.9112	8.0%
Ctl * 104	3.8344		4.2896	3.2922	
Hematocrit	36.188	6.01	47	19	16.6%
Leucocrit	1.031	0.62	2.0		60.0%
Plasma Protein	3.943	0.64	5.1	2.6	16.2%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hindgut	Kidney	Liver	Bile	Flesh	Opercle	Deformities	Skin Lesions	Fin Deformities
N 94%	N 100%	N 71%	0 35%	0 47%	B 29%	0 100%	N 100%	A 24%	0 65%	0 100%	0 94%	N	N	N
B1	F	S 29%	1 65%	1 47%	R 71%	1	S	B 65%	1 24%	1	1	V	R	Pc
B2	C	L	2	2	G	2	M	C	2 6%	2	2 6%	M	OP	Pl
E1	M	S&L	X 0.65	3 6%	NO	X 0	G	D	3 6%	X 0	X 0.12	C	F	An
E2	P	I		4	E		U	E 12%	X 0.53			O	L	V
H1 6%	OT	OT		X 0.65	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														

Summary of Normals

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hindgut	Kidney	Liver	Bile	Flesh	Opercle	Deformities	Skin Lesions	Fin Deformities
94%	100%	71%	35%		100%	100%	100%	88%		100%	94%			

Summary of Means

Thymus	Mesentery Fat	Hindgut	Bile	Flesh	Opercle	Mean deformities
.6 47	.6 47	0	0.53	0	0.12	

Summary of Specific Percent Indices

Thymus	Mesentery Fat	Hindgut	Bile	Flesh	Opercle	Percent of possible
32.35%	16.2%	0%	17.6%	0%	5.88%	

Summary of Combined Percent Indices

Normality index:	88.2	Severity Index:	0.56	Feeding Index:	82.4

Sex: M 29% F 47% U 24%

General Remarks

Fins

Skin

Gonads

Other

File: 4SJ1B

Fish Necropcies

Wildlife Resources 11/99

Date 12-Mar-01 Unit ______ Species RT Strain ______

Location SAN JUAN RIVER Fish source ______ Age JUVENILE

Mark/lot ______ Egg source ______ Hatch date ______

Investigator(s) BOR/NMDGF Water temp C° ______

Reason for necropsy: SPRING BASELINE Code ___ Remarks ______

Disease survey No: ______ Custody No ______

Quality Control # 4SJ1B

Case History # ______

Tissue Collection # ______

Water Hardness ______

DAM TO TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Sex	Hematocrit	Leukocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1B91	216	101	1.002	N	N	N	0	0	B	0	N	A	0	M	40	0	3.41	0	0				parasite on gill
1B92	221	109	1.010	N	N	N	1	0	R	0	N	B	1	F	38	1	4.54	0	0				
1B93	252	190	1.187	N	N	S	0	1	B	0	N	E	0	M	39	1.5	5.1	0	0				
1B94	243	166	1.157	N	N	N	1	1	R	0	N	B	1	U	35	1.5	4.36	0	0				whirling disease??
1B95	220	111	1.042	N	N	N	1	0	R	0	N	A	0	F	38	1	4.34	0	0				
1B96	160	41	1.001	N	N	N	0	3	B	0	N	B	3	M	19	1	2.6	0	0				
1B97	152	32	0.911	N	N	N	0	0	R	0	N	B	1	F	36	1	3.18	0	0				
1B98	203	95	1.136	N	N	N	1	0	R	0	N	B	0	U	40	1	4.13	0	0				
1B99	250	184	1.178	N	N	S	1	1	R	0	N	A	0	M	38	2	4.29	0	0				
1B100	161	48	1.150	N	N	S	1	1	R	0	N	B	0	F	37	2	3.83	0	0				
1B101	166	45	0.984	H1	N	N	1	0	R	0	N	B	0	M	34	1.5	3.77	0	0				
1B102	258	179	1.042	N	N	S	1	1	B	0	N	E	0	F	47	1	4.53	0	2				
1B103	158	43	1.090	N	N	N	0	1	R	0	N	B	0	F	31	1	3.46	0	0				
1B104	132	24	1.043	N	N	N	1	1	R	0	N	B	2	U	30	0	4.24	0	0				
1B105	173	50	0.966	N	N	N	1	0	B	0	N	B	1	U				0	0				no plasma, parasites in hind gut
1B106	173	51	0.985	N	N	S	0	0	R	0	N	B	0	F	38	0	3.22	0	0				
1B107	215	115	1.157	N	N	N	1	1	R	0	N	A	0	F	39	1	4.09	0	0				parasites in hind gut

General Remarks

Fins ______ Gonads ______

Skin ______ Other ______

Summary of Necropsies

Location: SAN JUAN RIVER

Quality Control No.: 45J2A

Species:	RT	Necropsy Date:	March 13, 2001	Sample Size:	30
Strain:		Age:	ADULT	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	SPRING BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	427.1	25.75	475	375	6.0%
Weight (g)	801.1	158.9	1160.0	563.0	19.8%
Ktl * 105	1.0200	0.11	1.2335	0.7987	11.1%
Ctl * 104	3.6851		4.4567	2.8858	
Hematocrit	39.000	6.81	49	15	17.5%
Leucocrit	0.536	0.51	1.0		94.8%
Plasma Protein	4.401	0.96	5.7	2.3	21.7%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesenteric Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 73%	N 67%	N 23%	0 83%	0 53%	B 43%	0 90%	N 83%	A 53%	0 57%	0 93%	0 90%	N	N	N
B1 3%	F 20%	S 60%	1 17%	1 33%	R 3%	1 10%	S 7%	B 20%	1 20%	1	1 10%	V	R	Pc
B2 3%	C 7%	L 3%	2	2 10%	G 43%	2	M	C	2 7%	2 7%	2	M	OP	Pt
E1 7%	M	S&L 7%	X 0.17	3 3%	NO 10%	X #####	G	D	3 17%	X #####	X 0.10	C	F	An
E2 7%	P	I 7%		4	E		U 7%	E 17%	X 0.83			O	L	V
H1 3%	OT 7%	OT		X 0.63	OT		OT 3%	F 10%				F	T	C
H2								OT				R	OT	Ad
M1 3%												OT		D
M2														OT
OT														
Summary of Normals														
73%	67%	23%	83%		90%	90%	83%	73%		93%	90%			
Summary of Means												Mean deformities		
			.167	.6 33		0.10			0.83	0.13	0.10			
Summary of Specific Percent Indices												Percent of possible		
			8.33%	15.8%		5.00%			27.8%	6.67%	5.00%			

Summary of Combined Percent Indices

Normality index:	76.7	Severity index:	6.25	Feeding Index:	72.2

Sex: M 53% F 47% U

General Remarks

Fins one caudal fin with lesion

Skin one with open wound on side

Gonads females - 4 gravid, 4 post-spawn

Other 14 fish with damage from anglers

File: 45J2A

Fish Necropcies

Wildlife Resources 11/99

Date 13-Mar-01 Unit _____ Species RT Strain _____

Location SAN JUAN RIVER Fish source _____ Age ADULT

Mark/lot _____ Egg source _____ Hatch date _____

Investigator(s) BOR/NMDGF Water temp C° _____

Reason for necropsy: SPRING BASELINE Code ___ Remarks _____

Disease survey No: _____ Custody No _____

Quality Control # 4SJ2A

Case History # _____

Tissue Collection # _____

Water Hardness _____

BELOW TEXAS HOLE

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2A91	461	923	0.942	E1	F	S	0	0	G	0	N	F	3	F	29	0	2.61	0	1				post-spawn
2A92	384	581	1.026	M1	N	S	0	2	G	0	N	A	0	F	49	1	5.1	0	0				
2A93	403	721	1.102	N	OT	S	0	0	B	0	N	E	2	M	40		2.75	0	0				gills hemorr., wound/side, parasite/gut
2A94	415	575	0.804	B2	N	L	0	0	G	0	N	B	0	M	34	1	3.4	0	0				parasites in hind gut
2A95	442	1001	1.159	N	N	I	0	0	G	0	N	A	0	M	46	0	4.94	0	0				
2A96	410	614	0.891	N	F	S&L	0	0	B	0	N	E	3	M	45	0	3.76	0	0				dislocated mandible, torn operacle
2A97	422	813	1.082	N	N	S	0	1	G	0	S	A	0	F	28	0	4.09	0	0				post-spawn, parasites in hind gut
2A98	375	601	1.140	N	N	N	1	3	G	0	N	F	0	M	45	1	5.35	0	0				parasites in hind gut
2A99	454	916	0.979	N	N	S	0	0	B	1	N	A	2	F	42	1	4.87	2	0				postspwn, lesion/tail, missing maxillary
2A100	449	723	0.799	N	F	S	0	0	B	0	N	F	0	F	30	1	2.82	0	0				parasite/gut, damaged jaw, brokn maxill
2A101	424	696	0.913	N	N	S	0	0	G	0	N	B	0	F	40	1	3.58	2	0				missing maxillary, parasites in hind gut
2A102	425	929	1.210	N	N	S	1	1	B	1	S	A	0	F	40	0	4.89	0	0				
2A103	418	602	0.824	E2	F	S&L	0	0	NO	0	N	E	3	F	39	1	3.17	0	0				cataracts on both eyes, parasites/gut
2A104	388	563	0.964	N	N	S	0	1	B	0	N	B	1	M	40	1	5.3	0	0				cataract forming in one eye
2A105	378	612	1.133	H1	OT	S	1	2	B	0	U	A	0	M	35	0	5.72	0	0				infection/gill, hook injury/mouth, parasite
2A106	452	964	1.044	E1	F	S	0	0	NO	0	N	B	0	M	38	0	4.41	0	0				parasites/gut, severe jaw damage
2A107	454	1054	1.126	N	N	S	0	0	B	0	N	E	0	F	37	1	4.75	0	0				gravid, parasites in hind gut
2A108	424	750	0.984	B1	C	S	0	0	B	1	N	B	3	F	15	0	2.31	0	0				postspawn, maxillary missing
2A109	428	756	0.964	N	F	I	0	1	R	0	N	A	0	M	47	1	5.36	0	0				left operacle damaged, parasites in gut
2A110	428	859	1.096	N	N	N	0	0	B	0	N	A	0	M	37		4.51	0	0				maxillary missing
2A111	406	659	0.985	N	N	N	0	1	G	0	N	A	0	M	37	1	3.83	0	0				parasites in hind gut
2A112	453	860	0.925	N	N	S	0	1	G	0	N	A	0	M	40	0	4.84	0	0				parasites in hind gut
2A113	446	925	1.043	N	N	N	0	1	G	0	N	A	0	M	38	0	4.7	0	1				broken maxillary
2A114	475	1160	1.082	N	N	S	1	1	G	0	U	A	1	F	42	0	4.33	0	0				parasites in hind gut
2A115	447	845	0.946	N	N	N	0	2	B	0	N	E	3	M	44	1	4.89	0	0				both maxillaries missing
2A116	422	927	1.234	N	N	S	0	0	B	0	OT	A	1	F	45	0	5.02	0	0				gravid, parasites/gut, kidney/hemorrag
2A117	448	875	0.973	N	N	S	0	1	G	0	N	A	0	M	42	0	4.57	0	0				parasites in hind gut, broken maxillary
2A118	453	967	1.040	E2	N	S	0	0	B	0	N	B	1	F	44	1	5.35	0	0				gravid, parast/gut, eye/hemorr, jaw dmg
2A119	410	783	1.136	N	C	N	0	0	NO	0	N	A	1	F	40	1	5.14	0	0				gravid
2A120	420	780	1.053	N	N	N	1	1	G	0	N	A	1	M	42	1	5.66	0	1				broken jaw

General Remarks

Fins one caudal fin with lesion

Gonads females - 4 gravid, 4 post-spawn

Skin one with open wound on side

Other 14 fish with damage from anglers

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	4SJ2B
Species:	RT	Necropsy Date:	March 13, 2001	Sample Size:	28
Strain:		Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMDGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	SPRING BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	182.7	31.13	228	122	17.0%
Weight (g)	67.0	34.5	134.0	18.0	51.6%
Ktl * 105	0.9918	0.09	1.1557	0.8296	9.0%
Ctl * 104	3.5834		4.1755	2.9975	
Hematocrit	41.111	6.06	53	29	14.7%
Leucocrit	0.759	0.47	1.5		61.6%
Plasma Protein	4.403	0.66	5.8	3.1	14.9%
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesenteric Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 100%	N 93%	N 79%	0 46%	0 18%	B 11%	0 100%	N 100%	A 14%	0 50%	0 100%	0 96%	N	N	N
B1	F	S 14%	1 54%	1 68%	R 79%	1	S	B 79%	1 36%	1	1	V	R	Pc
B2	C	L	2	2 7%	G 14%	2	M	C 4%	2 11%	2	2 4%	M	OP	Pl
E1	M	S&L	X 0.54	3 7%	NO	X 0	G	D	3 4%	X 0	X 0.07	C	F	An
E2	P 7%	I 7%		4	E		U	E	X 0.68			O	L	V
H1	OT	OT		X 1.04	OT		OT	F				F	T	C
H2								OT 4%				R	OT	Ad
M1												OT		D
M2														OT
OT														
					Summary of Normals									
100%	93%	79%	46%		100%	100%	100%	93%		100%	96%			
					Summary of Means							Mean deformities		
			.5 36	1.0 36		0			0.68	0	0.07			
					Summary of Specific Percent Indices							Percent of possible		
			26.79%	25.9%		0%			22.6%	0%	3.57%			

Summary of Combined Percent Indices

Normality index:	90.7	Severity Index:	7.59	Feeding Index:	77.4

Sex: M 39% F 61% U

General Remarks

Fins

Skin 4 fish with lesions

Gonads

Other

File: 4SJ2B

Fish Necropcies

Wildlife Resources 11/99

Date 13-Mar-01 Unit ______ Species RT Strain ______ Quality Control # 4SJ2B

Location SAN JUAN RIVER Fish source ______ Age JUVENILE Case History # ______

Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______

Investigator(s) BOR/NMDGF Water temp C° ______ Water Hardness ______

Reason for necropsy: SPRING BASELINE Code ___ Remarks BELOW TEXAS HOLE

Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10⁵	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2B91	167	49	1.052	N	N	N	1	1	R	0	N	B	0	M	44	0	4.7	0	0				
2B92	130	20	0.910	N	N	N	0	1	G	0	N	A	1	F	38	1	4.1	0	0				transparent liver
2B93	157	37	0.956	N	N	N	0	1	B	0	N	A	0	F	40	1.5	5.13	0	0				
2B94	210	99	1.069	N	P	N	0	1	G	0	N	B	2	F	40	1	5.12	0	2				gills hemorr., whirling disease??
2B95	122	18	0.991	N	N	N	1	0	R	0	N	B	1	F			4.1	0	0				no hematocrits
2B96	173	52	1.004	N	N	N	0	1	G	0	N	B	1	F	47	1	5.8	0	0				lesion base of pelvic girdle, parasite/gut
2B97	208	104	1.156	N	N	N	1	1	R	0	N	B	0	F	42	1	4.47	0	0				
2B98	210	91	0.983	N	N	S	0	1	R	0	N	B	0	F	37	0	4.23	0	0				
2B99	217	103	1.008	N	N	N	1	1	R	0	N	B	0	F	39	1	4.55	0	0				
2B100	163	43	0.993	N	N	N	1	1	R	0	N	B	1	M	33	1		0	0				lesions/caudal peduncle, no plasma
2B101	208	99	1.100	N	N	N	0	1	R	0	N	B	0	M	34	0	3.79	0	0				
2B102	218	111	1.071	N	N	S	1	3	R	0	N	B	0	F	39	0	4.83	0	0				parasites in hind gut
2B103	228	113	0.953	N	N	N	1	1	R	0	N	B	1	M	48	1	4.05	0	0				parasites in hind gut
2B104	222	121	1.106	N	N	N	1	1	R	0	N	B	0	M	42	1	3.92	0	0				parasites in hind gut
2B105	228	134	1.131	N	N	S	0	3	G	0	N	A	0	M	50	0	5.45	0	0				
2B106	163	36	0.831	N	N	N	1	2	R	0	N	B	1	F	42	1	5.6	0	0				
2B107	196	74	0.983	N	N	N	0	0	R	0	N	B	1	M	33	1	3.96	0	0				
2B108	209	88	0.964	N	N	I	1	0	R	0	N	B	0	F	37	1	3.86	0	0				
2B109	192	66	0.932	N	N	N	0	0	R	0	N	B	0	F	42	1	4.17	0	0				
2B110	173	48	0.927	N	N	I	1	1	R	0	N	OT	1	F	46	1	4.44	0	0				hemorr. in liver and mesentery wall
2B111	176	47	0.862	N	N	N	0	1	R	0	N	B	3	F	37	1	3.13	0	0				lesion on side, parasite/inner operacle
2B112	175	47	0.877	N	N	N	1	1	R	0	N	B	1	F	48	1	4.4	0	0				
2B113	150	28	0.830	N	N	N	1	0	R	0	N	B	2	M	38	1	4.5	0	0				
2B114	196	84	1.116	N	N	N	0	1	R	0	N	B	0	M	35	1	3.63	0	0				lesion at base of dorsal fin
2B115	146	32	1.028	N	P	S	0	1	B	0	N	C	2	M	29	1	3.68	0	0				
2B116	192	75	1.060	N	N	N	0	2	B	0	N	A	1	F	51	0	4.13	0	0				parasites in hind gut
2B117	153	33	0.921	N	N	N	1	1	R	0	N	B	0	F	53	0	5.3	0	0				
2B118	134	23	0.956	N	N	N	1	1	R	0	N	B	0	M	46	1	3.85	0	0				

General Remarks

Fins ______ Gonads ______

Skin 4 fish with lesions Other ______

Summary of Necropsies

Location: SAN JUAN RIVER

Quality Control No.: SSJ1A

Species: ALTR
Strain: RAINBOW
Mark/Lot:
Unit:
Fish Source:
Egg Source:
Hatch Date:
Remarks: DAM TO TEXAS HOLE

Necropsy Date: August 28, 2001
Age: ADULT
Water Temp in C°:
Water Hardness:
Investigators: BOR/NMGF
Reason for Necropsy: SUMMER BASELINE

Sample Size: 30
Tissue Collection No.:
Disease Survey No.:
Case History No.:
Custody No.:
Purpose Code:

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	414.4	39.67	480	310	9.6%
Weight (g)	833.0	225.5	1291.0	393.0	27.1%
KtI * 105	1.1567	0.18	1.6813	0.8406	15.7%
CtI * 104	4.1791		6.0745	3.0372	
Hematocrit	45.448	9.34	68	25	20.6%
Leucocrit	1.000		1.0	1.0	
Plasma Protein					#VALUE!
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 77%	N 80%	N 37%	0 60%	0 23%	B 40%	0 97%	N 83%	A 77%	0 43%	0 83%	0 93%	N	N	N
B1 10%	F 10%	S 57%	1 27%	1 50%	R 23%	1 3%	S 10%	B	1 23%	1 17%	1 7%	V	R	Pc
B2 13%	C	L 3%	2 13%	2 20%	G 20%	2	M	C	2 3%	2	2	M	OP	Pl
E1	M 3%	S&L 3%	X 0.53	3 7%	NO 13%	X 3.33%	G	D	3 30%	X #####	X 0.07	C	F	An
E2	P 3%	I		4	E		U 7%	E 3%	X 1.20			O	L	V
H1	OT 3%	OT		X 1.10	OT		OT	F 13%				F	T	C
H2								OT 7%				R	OT	Ad
M1												OT		D
M2														OT
OT														
Summary of Normals														
77%	80%	37%	60%		83%	97%	83%	77%		83%	93%			
Summary of Means												Mean deformities		
			.5 33	1.1		0.03			1.20	0.17	0.07			
Summary of Specific Percent Indices												Percent of possible		
			26.67%	27.5%		1.67%			40.0%	8.33%	3.33%			

Summary of Combined Percent Indices

Normality index: 77.0	Severity Index: 10.00	Feeding Index: 60.0

Sex: M 47% F 53% U

General Remarks

Fins: one fish w/fungus on caudal fin

Skin: two fish with external lesions

Gonads: 4 developing eggs, 4 absorbing eggs, 1 ripe female

Other: 14 with damaged jaws from anglers

Fish Necropcies

Wildlife Resources 11/99

Date 28-Aug-01 Unit ______ Species ALTR Strain RAINBOW Quality Control # 55J1A

Location SAN JUAN RIVER Fish source ______ Age ADULT Case History # ______

Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______

Investigator(s) BOR/NMGF Water temp C° ______ Water Hardness ______

Reason for necropsy: SUMMER BASELINE Code ___ Remarks DAM TO TEXAS HOLE

Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1A121	457	1083	1.135	N	M	S	0	2	G	0	U	A	1	M	41	1		0	0				electroshock damage
1A122	381	649	1.173	N	N	S	0	1	R	0	N	A	0	M	50	1		0	0				electroshock damage
1A123	466	1291	1.276	N	N	S	1	1	R	0	N	E	1	F	52	1		0	0				developing eggs
1A124	339	655	1.681	N	N	S	1	1	R	0	N	A	0	F	45	1		0	0				
1A125	380	832	1.516	N	N	S	0	3	N	0	N	A	0	F	42	1		0	0				developing eggs, thymus enlarged
1A126	425	690	0.899	B2	P	S	0	0	B	1	S	F	0	M	25	1		0	0				fungus on tail, maxillary damaged
1A127	310	393	1.319	N	N	N	1	2	B	0	N	A	0	M	39	1		0	0				electro damage to liver?? - discoloration
1A128	370	596	1.177	N	N	SAL	2	1	B	0	N	A	1	M	38	1		1	0				parasites/cut, damgd jaw, thymus enlrg
1A129	430	892	1.122	N	F	N	2	2	R	0	N	F	3	F	38	1		0	0				damaged jaw
1A130	405	845	1.272	N	N	S	1	1	B	0	N	A	0	M	49	1		0	0				damaged jaw, lesion on head
1A131	480	1211	1.095	N	N	N	1	1	B	0	N	A	2	F	38	1		0	1				damaged jaw
1A132	395	641	1.040	N	N	N	0	2	B	0	N	A	1	M	37	1		0	0				fungus @ left orbit, electro dmg/kidney
1A133	455	1074	1.140	N	F	S	0	1	B	0	S	A	0	F				1	0				electro damage to kidney??
1A134	430	774	0.973	N	N	S	0	0	G	0	N	F	3	F	55	1		0	0				absorb/eggs, line/vent, dmg jaw, lesion
1A135	425	992	1.292	N	N	S	2	2	G	0	N	A	0	M	58	1		0	1				
1A136	400	788	1.231	N	N	S	0	1	G	0	N	A	3	M	59	1		0	0				
1A137	450	966	1.060	B1	N	N	0	1	R	0	N	A	0	F	58	1		1	0				develop/eggs, damaged jaw, parasites
1A138	440	885	1.039	N	N	N	0	1	G	0	N	A	0	M	48	1		0	0				damaged jaw
1A139	380	622	1.134	N	F	N	2	2	B	0	N	A	1	M	57	1		0	0				enlarged thymus, parasites
1A140	415	649	0.908	B1	N	S	0	1	R	0	N	A	3	F	47	1		0	0				damaged jaw, electro dmge to kidney
1A141	430	1164	1.464	N	OT	S	0	1	NO	0	U	OT	3	F	47	1		1	0				ripe, liver enlrg/nodules, lamellae missing
1A142	470	1114	1.073	B2	N	S	0	0	B	0	N	A	3	F	37	1		1	0				absorb/eggs, damaged jaw
1A143	420	941	1.270	B1	N	S	1	0	B	0	S	OT	1	F	46	1		0	0				absorb/eggs, nodule in liver, dmged jaw
1A144	440	920	1.080	N	N	N	0	1	G	0	N	A	3	F	41	1		0	0				developing eggs, damaged jaw
1A145	390	655	1.104	N	N	N	0	1	B	0	N	A	3	M	51	1		0	0				damaged jaw
1A146	400	538	0.841	B2	N	S	0	0	NO	0	N	A	0	M	28	1		0	0				damaged jaw
1A147	380	591	1.077	N	N	N	1	1	R	0	N	A	0	F	42	1		0	0				
1A148	375	622	1.179	N	N	N	1	3	NO	0	N	A	1	F	48	1		0	0				
1A149	455	1090	1.157	B2	N	S	0	0	B	0	N	F	3	F	39	1		0	0				absorbing eggs
1A150	440	828	0.972	N	N	L	0	0	NO	0	N	A	0	M	68	1		0	0				damaged jaw, parasites
31																							
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General Remarks

Fins one fish w/fungus on caudal fin

Gonads 4 developing eggs, 4 absorbing eggs, 1 ripe female

Skin two fish with external lesions

Other 14 with damaged jaws from anglers

Summary of Necropsies

Location:	SAN JUAN RIVER			Quality Control No.:	5SJ1B
Species:	ALTR	Necropsy Date:	August 28, 2001	Sample Size:	30
Strain:	RAINBOW	Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	SUMMER BASELINE		
Remarks:	DAM TO TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	155.7	25.99	205	120	16.7%
Weight (g)	49.4	27.8	119.0	21.0	56.2%
Ktl * 105	1.2066	0.16	1.5038	0.8856	13.0%
Ctl * 104	4.3593		5.4334	3.1998	
Hematocrit	42.690	6.54	55	28	15.3%
Leucocrit	1.000		1.0	1.0	
Plasma Protein					#VALUE!
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fin	Opercle	Deformities	Skin Lesions	Fin Deformities
N 100%	N 97%	N 77%	0 23%	0 10%	B	0 100%	N 100%	A 23%	0 77%	0 100%	0 90%	N	N	N
B1	F	S 23%	1 70%	1 83%	R 100%	1	S	B 73%	1 20%	1	1 10%	V	R	Pc
B2	C	L	2 7%	2 7%	G	2	M	C 3%	2	2	2	M	OP	Pl
E1	M	S&L	X 0.83	3	NO	X 0	G	D	3 3%	X 0	X 0.10	C	F	An
E2	P 3%	I		4	E		U	E	X 0.30			O	L	V
H1	OT	OT		X 0.97	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														
Summary of Normals														
100%	97%	77%	23%		100%	100%	100%	97%		100%	90%			
Summary of Means												Mean deformities		
			.8 33	.9 67		0			0.30	0	0.10			
Summary of Specific Percent Indices												Percent of possible		
			41.67%	24.2%		0%			10.0%	0%	5.00%			

Summary of Combined Percent Indices

Normality index:	88.3	Severity Index:	11.67	Feeding Index:	90.0

Sex: M 30% F 50% U 20%

General Remarks

Fins

Skin

Gonads

Other

Fish Necropcies

Wildlife Resources 11/99

Date 28-Aug-01 Unit ______ Species ALTR Strain RAINBOW Quality Control # 5SJ18

Location SAN JUAN RIVER Fish source ______ Age JUVENILE Case History # ______

Mark/lot ______ Egg source ______ Hatch date ______ Tissue Collection # ______

Investigator(s) BOR/NMGF Water temp C° ______ Water Hardness ______

Reason for necropsy: SUMMER BASELINE Code ___ Remarks DAM TO TEXAS HOLE

Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
1B121	180	70	1.200	N	N	N	2	1	R	0	N	B	0	M	28	1		0	0				
1B122	145	32	1.050	N	N	N	0	1	R	0	N	B	0	F	37	1		0	0				
1B123	160	53	1.294	N	N	N	1	1	R	0	N	B	0	F	34	1		0	0				
1B124	140	39	1.421	N	N	N	1	1	R	0	N	B	0	U	41	1		0	0				
1B125	155	34	0.913	N	N	N	1	1	R	0	N	B	1	F	52	1		0	0				
1B126	160	43	1.050	N	N	N	1	1	R	0	N	B	1	U	40	1		0	0				
1B127	205	119	1.381	N	N	S	0	1	R	0	N	A	1	F	50	1		0	1				
1B128	135	37	1.504	N	N	N	1	0	R	0	N	A	0	U	50	1		0	0				whirling disease??
1B129	120	21	1.215	N	N	S	1	1	R	0	N	B	1	F	36	1		0	0				
1B130	200	99	1.238	N	N	S	1	1	R	0	N	B	0	F	46	1		0	0				
1B131	150	47	1.393	N	N	N	1	1	R	0	N	A	0	F	35	1		0	0				
1B132	160	47	1.147	N	N	N	1	1	R	0	N	B	0	F	46	1		0	0				
1B133	125	24	1.229	N	N	N	0	1	R	0	N	B	0	F	35	1		0	0				
1B134	130	29	1.320	N	N	N	1	1	R	0	N	B	0	F	41	1		0	0				
1B135	170	63	1.282	N	N	N	1	1	R	0	N	B	0	M	40	1		0	0				
1B136	120	21	1.215	N	N	N	1	1	R	0	N	B	0	U	52	1		0	0				fat mesentery
1B137	150	37	1.096	N	N	N	2	1	R	0	N	A	0	F	44	1		0	0				
1B138	145	27	0.886	N	N	N	0	0	R	0	N	B	1	F	44	1		0	0				
1B139	125	23	1.178	N	N	S	1	1	R	0	N	B	0	F	44	1		0	0				
1B140	205	103	1.196	N	N	N	1	1	R	0	N	B	0	M	35	1		0	0				
1B141	185	68	1.074	N	N	N	1	1	R	0	N	B	0	M	48	1		0	0				
1B142	205	113	1.312	N	N	S	1	1	R	0	N	B	0	M	40	1		0	0				
1B143	135	37	1.504	N	N	N	1	2	R	0	N	C	0	U	48	1		0	0				
1B144	135	26	1.057	N	P	N	0	1	R	0	N	B	0	M				0	1				hematocrits too light (contaminated?)
1B145	175	72	1.343	N	N	S	1	1	R	0	N	A	0	M	45	1		0	0				
1B146	135	29	1.179	N	N	N	0	1	R	0	N	A	0	U	43	1		0	1				
1B147	180	61	1.046	N	N	N	0	2	R	0	N	B	3	F	55	1		0	0				
1B148	150	36	1.067	N	N	N	1	1	R	0	N	A	0	M	51	1		0	0				
1B149	140	36	1.312	N	N	S	1	1	R	0	N	B	0	M	37	1		0	0				
1B150	150	37	1.096	N	N	N	1	0	R	0	N	B	1	F	41	1		0	0				
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General Remarks

Fins ______ Gonads ______

Skin ______ Other ______

Summary of Necropsies

Location: SAN JUAN RIVER

Quality Control No.: 5SJ2A

Species:	ALTR	Necropsy Date:	August 29, 2001	Sample Size:	30
Strain:	RAINBOW	Age:	ADULTS	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	SUMMER BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	441.1	23.18	485	400	5.3%
Weight (g)	947.8	203.9	1350.0	553.0	21.5%
Ktl * 105	1.0936	0.15	1.3417	0.6955	13.9%
Ctl * 104	3.9512		4.8477	2.5130	
Hematocrit	40.567	9.14	58	15	22.5%
Leucocrit	1.067	0.37	3.0	1.0	34.2%
Plasma Protein					#VALUE!
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 50%	N 73%	N 30%	0 80%	0 40%	B 63%	0 100%	N 97%	A 90%	0 80%	0 93%	0 93%	N	N	N
B1 13%	F 10%	S 60%	1 20%	1 53%	R 3%	1	S 3%	B 3%	1 3%	1 7%	1 7%	V	R	Pc
B2 3%	C 10%	L 3%	2	2 3%	G 17%	2	M	C	2 7%	2	2	M	OP	Pl
E1 10%	M	S&L 7%	X 0.20	3 3%	NO 7%	X 0	G	D	3 10%	X 6.67%	X 0.07	C	F	An
E2 10%	P 7%	I		4	E		U	E 3%	X 0.47			O	L	V
H1	OT	OT		X 0.70	OT 10%		OT	F 3%				F	T	C
H2								OT				R	OT	Ad
M1 3%												OT		D
M2														OT
OT 10%														

	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
Summary of Normals	50%	73%	30%	80%		63%	100%	97%	93%		93%	93%			
Summary of Means				.2	.7		0			0.47	0.07	0.07	Mean deformities		
Summary of Specific Percent Indices				10.00%	17.5%		0%			15.6%	3.33%	3.33%	Percent of possible		

Summary of Combined Percent Indices

Normality index:	79.3	Severity Index:	4.17	Feeding Index:	84.4

Sex: M 40% F 60% U

General Remarks

Fins: one fish missing left pelvic fin

Skin:

Gonads: 3 spawned out, 8 absorbing eggs, 2 ripe females

Other: one w/scolosis, 16 w/jaw damage from anglers

Fish Necropcies

Wildlife Resources 11/99

Date 29-Aug-01 Unit ____ Species ALTR Strain RAINBOW

Quality Control # 55J2A

Location SAN JUAN RIVER Fish source ____ Age ADULTS

Case History # ____

Mark/lot ____ Egg source ____ Hatch date ____

Tissue Collection # ____

Investigator(s) BOR/NMGF Water temp C° ____

Water Hardness ____

Reason for necropsy: SUMMER BASELINE Code ____ Remarks BELOW TEXAS HOLE

Disease survey No: ____ Custody No ____

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind Gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle Deformities		Skin lesions	Fin Deformities	Remarks
2A121	430	553	0.696	N	N	N	0	0	G	0	N	A	3	F	31	1		0	0				spawned out, discoloration around eyes
2A122	485	1350	1.183	B1	C	S	0	1	B	0	N	A	0	F	44	1		0	0				spawned out, damaged jaw
2A123	410	680	0.987	N	N	N	0	1	B	0	N	A	0	M	46	1		0	0				parasites in hindgut
2A124	457	1034	1.083	M1	N	S	0	0	B	0	N	A	3	F	41	1		0	0				spawned out, 2nd eye exopthalmic
2A125	425	782	1.019	E2	N	N	0	1	B	0	N	A	2	M	47	1		0	0				damaged jaw, parasites in hindgut
2A126	446	954	1.075	E1	N	S	0	1	B	0	N	A	0	M	58	1		0	0				parasites in hindgut
2A127	410	849	1.232	N	N	S	0	1	B	0	N	A	0	F	30	1		0	0				absorbing eggs, dmgd jaw, hook in belly
2A128	410	843	1.223	N	N	S	1	2	OT	0	N	A	0	M	49	1		0	0				spln discolr, parsites, dmg jaw, line/vent
2A129	455	1077	1.143	N	F	S	0	0	B	0	N	A	0	M	37	1		0	0				electro damage to kidney
2A130	450	1178	1.293	B1	N	S	0	0	B	0	N	A	0	F	37	1		0	0				absorbing eggs, dmgd jaw, elctro/kidney
2A131	410	823	1.194	N	N	S	0	1	G	0	N	A	1	F	42	1		0	0				ripe
2A132	430	839	1.055	N	N	N	0	1	G	0	N	A	0	F	42	1		0	0				
2A133	460	1175	1.207	B1	C	S&L	0	0	B	0	N	E	0	M	46	1		0	0				2nd eye w/cataract, damaged jaw
2A134	450	1186	1.302	OT	N	N	1	1	B	0	N	A	0	F	45	1		0	0				absorbing eggs, scoliosis, cataracts
2A135	400	754	1.178	N	N	S	0	1	B	0	N	A	0	M	43	1		0	0				damaged jaw
2A136	425	1030	1.342	N	N	S	0	0	B	0	N	A	0	M	52	1		0	0				old fin erosion, damaged jaw
2A137	455	942	1.000	N	N	S&L	0	1	B	0	N	A	3	F	42	1		0	0				damaged jaw
2A138	440	1031	1.210	N	N	S	0	0	B	0	N	A	0	F	35	1		0	0				ripe
2A139	465	1082	1.076	E2	N	L	1	1	G	0	N	A	0	F	40	1		0	1				absorbing eggs, damaged jaw
2A140	410	796	1.155	N	N	S	1	1	G	0	N	A	2	F	39	1		1	0				damaged jaw
2A141	470	1086	1.046	OT	C	S	0	0	B	0	N	A	0	F	46	1		0	0				absorbing eggs, cataracts/exopthalmic
2A142	425	649	0.845	E2	P	N	0	0	OT	0	S	B	0	F	15	3		0	0				body mucous filled, dmg jaw, parasites
2A143	470	1248	1.202	OT	F	N	1	3	OT	0	N	A	0	F	52	1		0	0				spln/fatty nodules, eyes cataract/hemly
2A144	430	700	0.880	N	P	S	0	0	B	0	N	F	0	M	16	1		0	0				parasites/cut, line through vent
2A145	465	1001	0.996	N	N	S	0	1	B	0	N	A	0	M	40	1		0	0				dmg jaw, line/vent & mouth + gill damag
2A146	470	1034	0.996	B2	N	N	0	1	B	0	N	A	0	M	40	1		0	0				cataracts, damaged jaw
2A147	460	1049	1.078	N	N	N	1	1	NO	0	N	A	0	F	40	1		1	0				absorbing eggs
2A148	420	589	0.795	E1	N	S	0	0	R	0	N	A	0	F	33	1		0	0				absorbing eggs, parasites, dmgd jaw
2A149	440	942	1.106	E1	N	S	0	0	NO	0	N	A	0	M	46	1		0	0				opicl lesion, lft plvic fin missing, d.jaw
2A150	460	1179	1.211	B1	F	S	0	1	B	0	N	A	0	F	43	1		0	1				absorbing eggs
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General Remarks

Fins one fish missing left pelvic fin

Gonads 3 spawned out, 8 absorbing eggs, 2 ripe females

Skin ____

Other one w/scoliosis, 16 w/jaw damage from anglers

Summary of Necropsies

Location: SAN JUAN RIVER

Quality Control No.: 5SJ2S

Species:	ALTR	Necropsy Date:	August 29, 2001	Sample Size:	30
Strain:	RAINBOW	Age:	JUVENILE	Tissue Collection No.:	
Mark/Lot:				Disease Survey No.:	
Unit:		Water Temp in C°:		Case History No.:	
Fish Source:		Water Hardness:		Custody No.:	
Egg Source:		Investigators:	BOR/NMGF	Purpose Code:	
Hatch Date:		Reason for Necropsy:	SUMMER BASELINE		
Remarks:	BELOW TEXAS HOLE				

	MEAN	Standard Deviation	Max	Min	Coefficient of Variance
Length (mm)	176.7	33.65	230	130	19.0%
Weight (g)	77.2	47.4	163.0	24.0	61.4%
Ktl * 105	1.2146	0.17	1.5914	0.0841	13.9%
Ctl * 104	4.3885		5.7497	3.5554	
Hematocrit	43.033	4.97	54	33	11.5%
Leucocrit	1.000		1.0	1.0	
Plasma Protein					#VALUE!
Deformity Index					
Skin Lesion					
Fin Deformities					

Values as Percent of Total Sample

Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Fins	Opercle	Deformities	Skin Lesions	Fin Deformities
N 100%	N 93%	N 90%	0 20%	0 7%	B 7%	0 100%	N 97%	A 27%	0 97%	0 100%	0 90%	N	N	N
B1	F	S 10%	1 63%	1 50%	R 93%	1	S	B 73%	1 3%	1	1 10%	V	R	Pc
B2	C 7%	L	2 17%	2 43%	G	2	M	C	2	2	2	M	OP	Pl
E1	M	S&L	X 0.97	3	NO	X 0	G	D	3	X 0	X 0.10	C	F	An
E2	P	I		4	E		U 3%	E	X 0.03			O	L	V
H1	OT	OT		X 1.37	OT		OT	F				F	T	C
H2								OT				R	OT	Ad
M1												OT		D
M2														OT
OT														
					Summary of Normals									
100%	93%	90%	20%		100%	100%	97%	100%		100%	90%			
					Summary of Means							Mean deformities		
			.9 67	1.3 67		0			0.03	0	0.10			
					Summary of Specific Percent Indices							Percent of possible		
			48.33%	34.2%		0%			1.1%	0%	5.00%			

Summary of Combined Percent Indices

Normality index: 89.0	Severity Index: 13.33	Feeding Index: 98.9

Sex: M 30% F 47% U 23%

General Remarks

Fins one fish missing left pectoral fin

Skin

Gonads

Other

Fish Necropcies

Wildlife Resources 11/99

Date 29-Aug-01 Unit ______ Species ALTR Strain RAINBOW

Quality Control # 5SJ2B

Location SAN JUAN RIVER Fish source ______ Age JUVENILE

Case History # ______

Mark/lot ______ Egg source ______ Hatch date ______

Tissue Collection # ______

Investigator(s) BOR/NMGF Water temp C° ______

Water Hardness ______

Reason for necropsy: SUMMER BASELINE Code ___ Remarks BELOW TEXAS HOLE

Disease survey No: ______ Custody No ______

Sample Number	Length mm	Weight g	KTL * 10^5	Eyes	Gills	Pseudobranchs	Thymus	Mesentery Fat	Spleen	Hind gut	Kidney	Liver	Bile	Sex	Hematocrit	Leucocrit	Plasma Protein	Fins	Opercle	Deformities	Skin lesions	Fin Deformities	Remarks
2B121	145	30	0.984	N	N	N	1	1	B	0	N	A	0	F	40	1		0	0				
2B122	200	111	1.388	N	C	N	1	1	R	0	N	A	0	F	48	1		0	0				damaged jaw
2B123	145	30	0.984	N	N	N	1	2	R	0	N	B	1	M	44	1		0	0				
2B124	140	30	1.093	N	N	N	1	1	R	0	N	B	0	U	54	1		0	0				
2B125	153	37	1.033	N	N	N	0	0	R	0	N	A	0	U	42	1		0	0				whirling??, electro damage
2B126	145	33	1.082	N	N	N	1	2	R	0	N	B	0	F	37	1		0	0				
2B127	167	48	1.031	N	N	N	2	1	R	0	N	B	0	F	52	1		0	0				
2B128	150	37	1.096	N	N	N	1	1	R	0	N	B	0	U	41	1		0	0				
2B129	140	31	1.130	N	N	N	1	2	R	0	N	B	0	M	40	1		0	0				
2B130	140	29	1.057	N	N	N	0	2	R	0	N	B	0	M	49	1		0	0				
2B131	195	86	1.160	N	N	N	1	1	R	0	N	A	0	F	45	1		0	0				parasites in hind gut
2B132	135	27	1.097	N	N	N	1	1	R	0	N	A	0	F	40	1		0	0				
2B133	211	131	1.395	N	N	N	1	1	R	0	N	B	0	M	40	1		0	0				caught by hook & line, damaged jaw
2B134	150	37	1.096	N	N	N	1	2	R	0	N	B	0	M	47	1		0	1				
2B135	190	79	1.152	N	N	S	2	1	R	0	N	B	0	U	50	1		0	0				
2B136	135	34	1.382	N	N	N	1	2	R	0	N	B	0	U	33	1		0	0				caught by hook & line
2B137	220	134	1.258	N	N	N	1	2	R	0	N	A	0	F	47	1		0	0				
2B138	220	163	1.531	N	N	N	2	2	R	0	N	B	0	F	50	1		0	0				thymus swollen, angler caught
2B139	160	46	1.123	N	N	N	1	2	R	0	N	B	0	U	38	1		0	1				
2B140	225	133	1.168	N	C	N	2	1	R	0	N	B	0	F	47	1		0	0				thymus swollen, angler caught
2B141	180	88	1.509	N	N	N	1	2	R	0	N	B	0	U	39	1		0	0				missing left pectoral fin
2B142	160	48	1.172	N	N	S	0	0	R	0	N	B	0	F	40	1		0	0				
2B143	230	145	1.192	N	N	S	2	2	R	0	U	B	0	F	44	1		0	0				thymus swollen, angler caught
2B144	180	77	1.320	N	N	N	1	1	R	0	N	B	0	F	38	1		0	0				thymus swollen
2B145	210	112	1.209	N	N	N	1	1	R	0	N	B	0	F	42	1		0	1				thymus swollen, damaged jaw
2B146	220	153	1.437	N	N	N	1	1	R	0	N	B	0	F	39	1		0	0				
2B147	220	139	1.305	N	N	N	1	2	B	0	N	A	0	M	40	1		0	0				
2B148	195	118	1.591	N	N	N	0	2	R	0	N	B	0	M	45	1		0	0				
2B149	210	127	1.371	N	N	N	0	1	R	0	N	A	0	M	40	1		0	0				
2B150	130	24	1.092	N	N	N	0	1	R	0	N	B	0	M	40	1		0	0				
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General Remarks

Fins one fish missing left pectoral fin Gonads ______

Skin ______ Other ______

ATTACHMENT B

Total Protein Determination (Phenol Reagent Method for Biological Fluids)
Sigma Procedure No. 690

The procedure is based on the combined methods of the biuret and Lowry for determination of protein in plasma. The two methods were combined to improve stability of the reagents, and provide better sensitivity. Since the method is very sensitive, the plasma or sera sample is diluted so that the final protein concentration is between 15 and 100 mg/dl. The diluted protein is further diluted with the biuret reagent, and later with Folin and Ciocalteu's Phenol reagent. The color formed is read at a wavelength between 700 and 750 nm (725 nm). Protein concentrations are determined from the calibration curve.

Equipment, Materials, and Supplies

Adjustable pipets and tips (100-1000 uL; 10-100 uL), repeater pipettor, laboratory vortex, borosilicate glass tubes (5 and 10 mL) and test tube rack, spectrophotometer and cuvettes, timer. Sufficient pooled fish plasma and or a certified reference to serve as a control for assays (Sigma "Accutrol" Certified Standard Reference Material- prepare according to instructions). The Accutrol solution is stable 10 days at 4 C. Follow instructions for the preparation of the Accutrol Reference. Maintain a log for recording the Accutrol and the pooled fish sera. Sodium Chloride Solution (0.85%; 8.5 g NaCl dissolved in 1 liter of deionized water).

Set-Up Procedure

A. The sample must be diluted to obtain total protein in the range of the standard curve. A range-finding test may be necessary depending upon the level of total protein in the sample. This could vary between species or within species subjected to various environmental factors. The final dilution factor for the following assay is 101 (50 uL of the sample was diluted with 5.0 mL of NaCl solution). Treat the unknowns similarly to the Pooled Fish Sample and the Accutrol Reference Sample.

   In large test tubes (10 mL), pipet 5.0 mL of NaCl to all test tubes; pipet 50 uL of the sample to its respective tube and vortex.

B. Dilute protein standard - 0.05 mL standard in 5 mL NaCl.

C. In a second rack of test tubes (5 mL) label the tubes accordingly:

Test tube No.	Tube label	Contents of tube
1	Blank (0.0 mg/dL)	(0.10 mL NaCl)
2	Standard 25 mg/dL	(0.025 mL diluted Protein Standard + 0.075 mL NaCl)
3	Standard 50 mg/dL	(0..05 mL diluted Protein Standard + 0.05 mL NaCl)
4	Standard 75 mg/dL	(0.075mL diluted Protein Standard + 0.025 mL NaCl)
5	Standard 100 mg/dL	(0.10 mL diluted Protein Standard)

Test tube No.	Tube label	Contents of tube
6	Accutrol Reference	(0.10 mL diluted Reference)
7	Pooled Fish Sample	(0.10 mL diluted Pooled Fish Sample)
8	Unknown Fish Sample	(0.10 mL diluted unknown)
9	And so on...	Repeat step for tube #8 for each unknown.

Test Procedure

1. The Biuret Reagent is already prepared. There is sufficient amount of the Reagent to run 50 test tubes (including standards, references, and unknowns). Using the repeater pipettor, pipet 1.1 mL of the Reagent to all tubes. Vortex each tube immediately after addition of Reagent, and allow the tubes to incubate at room temperature for the 10 minutes. Begin timing the 10 minute incubation period with the first tube*.

2. After the 10 minutes, use the repeater pipettor to add to each tube 0.05 mL of the Folin and Ciocalteu's Phenol Reagent (this has also been prepared for you by the manufacture. There is sufficient sample to run 50 test tubes). Vortex each tube immediately after addition of Folin, and allow the tubes to incubate at room temperature for 30 minutes. Begin timing the 30 minute incubation period with the first tube*.

3. While the tubes are incubating, turn on the spectrophotometer and allow to warm up. Set the wavelength to 725 nm.

4. Plot the absorbance values (Y axis) versus the total protein concentration (x axis). From the standard curve, read the absorbance for the unknowns to get the diluted protein concentrations in mg/dL (mg/100 mL). Multiply the diluted concentration by 101 (dilution factor: 5.05 ÷ 0.05) to get the actual protein concentrations in mg/dL, then divide by 1000 to get g/dL. Total protein in reported as g/dL.

* For reproducibility of results, the timing of the 10-minute and 30-minute incubation periods as well as reading on the spectrophotometer should be consistent with each tube. When adding the Reagent and Folins from one tube to the next, allow the same amount of time required to read a sample on the spectrophotometer. This keeps the reading of each sample at 40 minutes from the time of the incubation of the Reagent (10 min) and the incubation of the Folins (30 min).

Quality Assurance - Quality Control
San Juan River Protein Determination

Accutrol Inter-assay Controls

Accutrol Control	Diluted Concn mg/dL	Actual Concn g/dL	Mean Concentration	
12/4/2000	64.685	6.533		
12/4/2000	64.131	6.477		
12/4/2000	62.406	6.303	6.266	
1/22/2001	60.511	6.112		
1/15/2001	64.228	6.487	Standard Deviation	
1/17/2001	62.512	6.314	0.30883207	
1/17/2001	64.164	6.481		
2/13/2001	52.590	5.312	n=16	**too old
2/12/2001	63.642	6.428		
2/12/2001	63.527	6.416		
4/19/2001	60.099	6.070		
4/19/2001	59.863	6.046		
4/19/2001	59.469	6.006		
10/10/2001	63.438	6.407		
10/10/2001	64.164	6.481		
10/10/2001	63.145	6.378		

Rainbow Trout Intra-assay Control

RBT Control	Diluted Concn mg/dL	Actual Concn g/dL	Mean Standard Deviation	r^2 values Std. Curves
12/4/2000	45.861	4.632	4.511	1.00
12/4/2000	43.238	4.367	0.13395585	
12/4/2000	44.890	4.534		
12/4/2000	45.333	4.579	4.628	1.00
12/4/2000	46.309	4.677	0.06967019	
1/22/2001	37.463	3.784	3.835	1.00
1/22/2001	38.484	3.887	0.07292256	
1/15/2001	45.317	4.577	4.641	1.00
1/15/2001	46.578	4.704	0.09004354	
1/17/2001	31.074	3.138	3.138	1.00
1/17/2001	31.064	3.137	0.00069275	
1/17/2001	31.884	3.220	3.231	0.96
1/17/2001	32.101	3.242	0.01551409	

2/13/2001 2/13/2001	35.211 34.551	3.556 3.490	3.523 0.04714217	1.00
2/12/2001 2/12/2001	45.485 47.487	4.594 4.796	4.695 0.14299412	1.00
2/12/2001 2/12/2001	46.581 45.798	4.705 4.626	4.665 0.05595798	1.00
4/19/2001 4/19/2001	35.335 36.529	3.569 3.689	3.629 0.08525855	1.00
4/19/2001 4/19/2001	34.765 35.447	3.511 3.580	3.546 0.04866908	1.00
4/19/2001 4/19/2001	35.757 35.787	3.611 3.614	3.613 0.00209468	1.00
10/10/2001 10/10/2001	67.636 69.395	6.831 7.009	6.920 0.12562388	1.00
10/10/2001 10/10/2001	67.848 71.134	6.853 7.185	7.019 0.23467884	1.00
10/10/2001 10/10/2001	68.699 70.854	6.939 7.156	7.047 0.15390533	1.00

Protein Determination - San Juan River
October, 2000

Sample Number	Diluted Concn mg/dL	Actual Concn g/dL	Comments	Mean Concn for each size/site group
1A01	40.755	4.116		
1A02	49.150	4.964		Site 1/Adult Mean
1A03	59.441	6.004		5.857
1A04	76.790	7.756		
1A05	45.749	4.621		Standard Deviation
1A06	46.035	4.650		2.203541435
1A07	105.005	10.606		
1A08	48.789	4.928		Standard Error
1A09	49.478	4.997		0.4023
1A10	81.264	8.208		
1A11	42.439	4.286		n=30
1A12	75.424	7.618		
1A13	39.322	3.972		
1A14	42.123	4.254		
1A15	55.183	5.573		
1A16	13.457	1.359	plasma too clear??	
1A17	49.464	4.996		
1A18	66.166	6.683		
1A19	64.593	6.524		
1A20	64.431	6.508		
1A21	70.726	7.143		
1A22	41.024	4.143		
1A23	68.364	6.905		
1A24	72.362	7.309		
1A25	104.104	10.515		
1A26	97.088	9.806		
1A27	57.984	5.856		
1A28	14.182	1.432		
1A29	53.042	5.357		
1A30	45.893	4.635		
1B01	61.726	6.234		Site 1/Juvnl Mean
1B02	48.581	4.907		5.006
1B03	47.556	4.803		
1B04	53.948	5.449		Standard Deviation
1B05	60.965	6.157	light hemolysis	0.719086159
1B06	45.274	4.573	lt. Hemo. - 25 uL	
1B07	37.162	3.753	light hemolysis	Standard Error
1B08	51.192	5.170	light hemolysis	0.1569
1B09	49.905	5.040	hemolysis - 25 uL	
1B10	43.057	4.349	light hemolysis	n=21
1B11	46.127	4.659	light hemolysis	

1B12	40.613	4.102	light hemolysis	
1B13	47.873	4.835	light hemo. - 25 uL	
1B14	41.896	4.231		
1B15	51.617	5.213	light hemolysis	
1B16	55.164	5.572		
1B17	48.870	4.936	dark red - 25 uL	
1B18	48.769	4.926	light hemolysis	
1B19	66.382	6.705		
1B20	49.313	4.981	hemolysis	
1B21	44.963	4.541		
2A01	54.919	5.547		Site 2/Adult Mean
2A02	41.591	4.201		5.965
2A03	48.808	4.930		
2A04	42.865	4.329		Standard Deviation
2A05	87.748	8.863		1.530422645
2A06	99.689	10.069		
2A07	82.949	8.378		Standard Error
2A08	57.797	5.837	hemolysis	0.2794
2A09	60.708	6.132		
2A10	39.237	3.963		n=30
2A11	33.508	3.384	light hemolysis	
2A12	43.558	4.399		
2A13	66.489	6.715		
2A14	51.981	5.250		
2A15	51.281	5.179	light hemolysis	
2A16	46.874	4.734		
2A17	61.629	6.225		
2A18	65.480	6.613	hemolysis	
2A19	60.394	6.100		
2A20	83.862	8.470		
2A21	50.758	5.127		
2A22	51.506	5.202		
2A23	65.943	6.660	light hemolysis	
2A24	66.648	6.731		
2A25	57.029	5.760	hemolysis	
2A26	56.515	5.708		
2A27	60.221	6.082	light hemolysis	
2A28	46.543	4.701		
2A29	74.995	7.574		
2A30	60.248	6.085		
2B01	56.246	5.681	light hemolysis	Site 2/Juvnl Mean
2B02	26.016	2.628	dark red/brwn - 25 uL	4.573
2B03	54.183	5.472	light hemo. - 25 uL	
2B04	48.157	4.864	light hemolysis	Standard Deviation
2B05	40.615	4.102		0.77582677
2B06	56.394	5.696		

2B07	37.460	3.783		Standard Error 0.1618
2B08	48.542	4.903		
2B09	55.555	5.611	light hemolysis	
2B10	48.168	4.865		n=23
2B11	45.688	4.614	light hemolysis	
2B12	43.624	4.406	light hemolysis	
2B13	46.027	4.649		
2B14	44.587	4.503		
2B15	37.689	3.807		
2B16	35.525	3.588	light hemolysis	
2B17	40.775	4.118	not enough plasma??	
2B18	47.150	4.762		
2B19	48.516	4.900		
2B20	53.819	5.436		
2B21	38.688	3.907		
2B22	50.225	5.073		
2B23	37.770	3.815	hemolysis	

Protein Determination - San Juan River
December, 2000

Sample Number	Diluted Concn mg/dL	Actual Concn g/dL	Comments	Mean Concn for each size/site group
1A31	94.413	9.536	some hemolysis	
1A32	81.249	8.206		Site 1/Adult Mean
1A33	44.462	4.491		5.731
1A34	44.727	4.517		
1A35	52.008	5.253		Standard Deviation
1A36	43.071	4.350		1.564774395
1A37	46.627	4.709		
1A38	65.538	6.619		Standard Error
1A39	93.285	9.422		0.2857
1A40	61.226	6.184		
1A41	55.629	5.619		n=30
1A42	53.802	5.434		
1A43	35.920	3.628		
1A44	57.508	5.808	some hemolysis	
1A45	52.982	5.351		
1A46	45.369	4.582		
1A47	68.662	6.935		
1A48	62.330	6.295		
1A49	41.887	4.231		
1A50	48.724	4.921		
1A51	49.774	5.027	hemolysis	
1A52	54.918	5.547		
1A53	58.108	5.869		
1A54	44.874	4.532		
1A55	73.783	7.452		
1A56	33.594	3.393		
1A57	62.232	6.285		
1A58	49.294	4.979		
1A59	81.408	8.222		
1A60	44.875	4.532		
1B31	43.890	4.433		Site 1/Juvnl Mean
1B32	47.170	4.764		4.143
1B33	52.674	5.320	some hemolysis	
1B34	40.271	4.067		Standard Deviation
1B35	40.842	4.125		0.72604381
1B36	41.278	4.169		
1B37	43.272	4.370		Standard Error
1B38	35.462	3.582	hemolysis	0.1372
1B39	34.141	3.448		
1B40	48.484	4.897		n=28
1B41	47.529	4.800		

1B42	36.510	3.688	hemolysis	
1B43	47.166	4.764		
1B44	34.846	3.519		
1B45	32.914	3.324		
1B46			not enough plasma	
1B47	63.549	6.418		
1B48	46.679	4.715		
1B49	36.499	3.686		
1B50	39.141	3.953		
1B51	35.021	3.537		
1B52	34.415	3.476		
1B53	27.739	2.802	hemolysis	
1B54	40.826	4.123		
1B55	39.453	3.985		
1B56	44.864	4.531		
1B57	39.572	3.997	some hemolysis	
1B58	36.834	3.720		
1B59	37.420	3.779	some hemolysis	
1B60			not enough plasma	
2A31	66.007	6.667		Site 2/Adult Mean
2A32	50.724	5.123		5.101
2A33	48.361	4.884		
2A34	54.356	5.490	some hemolysis	Standard Deviation
2A35	45.998	4.646		1.157493072
2A36	68.495	6.918		
2A37	36.857	3.723		Standard Error
2A38	50.355	5.086		0.2113
2A39	40.595	4.100		
2A40	50.811	5.132		n=30
2A41	52.568	5.309		
2A42	81.577	8.239		
2A43	56.514	5.708	some hemolysis	
2A44	77.859	7.864		
2A45	55.830	5.639		
2A46	40.046	4.045		
2A47	45.306	4.576		
2A48	38.407	3.879		
2A49	44.965	4.541		
2A50	48.889	4.938		
2A51	54.254	5.480		
2A52	39.919	4.032		
2A53	56.899	5.747		
2A54	47.418	4.789		
2A55	46.641	4.711		
2A56	42.751	4.318		
2A57	46.577	4.704		

2A58	56.475	5.704		
2A59	30.997	3.131		
2A60	38.725	3.911		
2B31	48.310	4.879		Site 2/Juvnl Mean
2B32	54.775	5.532		4.814
2B33	49.099	4.959	hemolysis	
2B34	47.776	4.825		Standard Deviation
2B35	48.623	4.911		0.842600277
2B36	44.127	4.457		
2B37	52.989	5.352		Standard Error
2B38	43.913	4.435		0.1652
2B39	52.297	5.282		
2B40	45.349	4.580		n=26
2B41	75.671	7.643		
2B42	59.266	5.986		
2B43	40.501	4.091		
2B44	47.230	4.770		
2B45	47.990	4.847		
2B46	47.119	4.759	some hemolysis	
2B47	51.866	5.238		
2B48	40.062	4.046	some hemolysis	
2B49	42.033	4.245	some hemolysis	
2B50	27.608	2.788	hemolysis - 25 uL	
2B51	44.217	4.466	hemolysis	
2B52	51.045	5.156	some hemolysis	
2B53	48.729	4.922	some hemolysis	
2B54	44.165	4.461	hemolysis - 25 uL	
2B55	46.068	4.653		
2B56	38.461	3.885	hemolysis - 25 uL	

Protein Determination - San Juan River
January, 2001

Sample Number	Diluted Concn mg/dL	Actual Concn g/dL	Comments	Mean Concn for each size/site group
1A61	39.494	3.989		
1A62	45.519	4.597		Site 1/Adult Mean
1A63	43.123	4.355		4.359
1A64	46.838	4.731		
1A65	57.221	5.779		Standard Deviation
1A66	80.750	8.156		1.102
1A67	26.491	2.676		
1A68	41.609	4.202		Standard Error
1A69	38.007	3.839		0.2013
1A70	57.717	5.829		
1A71	48.851	4.934		n=30
1A72	46.799	4.727		
1A73	41.731	4.215		
1A74	13.679	1.382		
1A75	31.199	3.151		
1A76	47.556	4.803		
1A77	41.698	4.211		
1A78	39.700	4.010		
1A79	48.704	4.919		
1A80	41.682	4.210		
1A81	45.878	4.634		
1A82	44.117	4.456		
1A83	49.644	5.014		
1A84	40.941	4.135		
1A85	40.037	4.044		
1A86	39.556	3.995	clear	
1A87	40.156	4.056		
1A88	40.671	4.108		
1A89	40.279	4.068		
1A90	35.063	3.541		
1B61	32.026	3.235		Site 1/Juvnl Mean
1B62	40.747	4.115		3.803
1B63	29.638	2.993		
1B64	41.433	4.185	some hemolysis	Standard Deviation
1B65	47.776	4.825		0.658
1B66	45.659	4.612		
1B67	43.978	4.442	some hemolysis	Standard Error
1B68	48.694	4.918		0.1202
1B69	31.500	3.182		
1B70	32.604	3.293		n=30
1B71	41.423	4.184		

1B72	28.856	2.915	some hemolysis	
1B73	40.210	4.061		
1B74	31.750	3.207	hemolysis	
1B75	34.141	3.448		
1B76	52.992	5.352		
1B77	33.299	3.363		
1B78	39.154	3.955		
1B79	37.539	3.791		
1B80	45.470	4.592		
1B81	33.606	3.394		
1B82	42.309	4.273		
1B83	30.692	3.100		
1B84	34.933	3.528		
1B85	41.572	4.199		
1B86	35.218	3.557	some hemolysis	
1B87	28.757	2.904	hemolysis	
1B88	33.526	3.386	some hemolysis	
1B89	31.022	3.133	hemolysis	
1B90	39.083	3.947	some hemolysis	
2A61	55.655	5.621		Site 2/Adult Mean
2A62	44.246	4.469		4.466
2A63	58.257	5.884		
2A64	45.636	4.609		Standard Deviation
2A65	75.279	7.603		1.142
2A66	50.347	5.085		
2A67	70.659	7.137		Standard Error
2A68	43.609	4.405		0.2085
2A69	38.135	3.852		
2A70	37.846	3.822		n=30
2A71	35.216	3.557	clear	
2A72	39.003	3.939		
2A73	42.983	4.341		
2A74	40.679	4.109	some hemolysis	
2A75	32.138	3.246		
2A76	19.443	1.964		
2A77	49.868	5.037		
2A78	49.771	5.027		
2A79	44.116	4.456		
2A80	46.073	4.653		
2A81	29.932	3.023		
2A82	45.355	4.581	some hemolysis	
2A83	43.985	4.442		
2A84	37.563	3.794		
2A85	44.281	4.472		
2A86	26.153	2.641		
2A87	40.567	4.097		

2A88	42.047	4.247		
2A89	51.562	5.208	hemolysis	
2A90	46.082	4.654		
2B61	33.116	3.345		Site 2/Juvnl Mean
2B62	32.668	3.299		4.047
2B63	41.375	4.179	hemolysis	
2B64	40.661	4.107		Standard Deviation
2B65	44.431	4.488		0.659
2B66	45.909	4.637		
2B67	42.948	4.338		Standard Error
2B68	36.772	3.714		0.1224
2B69	39.149	3.954		
2B70	38.860	3.925	some hemolysis	n=29
2B71			no plasma	
2B72	43.927	4.437	hemolysis	
2B73	31.958	3.228		
2B74	28.566	2.885	some hemolysis	
2B75	36.284	3.665	hemolysis	
2B76	39.864	4.026	some hemolysis	
2B77	47.440	4.791	hemolysis	
2B78	47.647	4.812	hemolysis	
2B79	32.596	3.292	some hemolysis	
2B80	39.197	3.959		
2B81	43.045	4.348		
2B82	53.565	5.410		
2B83	35.107	3.546	some hemolysis	
2B84	56.930	5.750	some hemolysis	
2B85	34.638	3.498	some hemolysis	
2B86	34.545	3.489	hemolysis	
2B87	41.060	4.147	hemolysis	
2B88	45.768	4.623	hemolysis	
2B89	35.446	3.580	hemolysis	
2B90	38.598	3.898		

Protein Determination - San Juan River
March, 2001

Sample Number	Diluted Concn mg/dL	Actual Concn g/dL	Comments	Mean Concn for each size/site group
1A91	46.602	4.707		
1A92	21.751	2.197		
1A93	37.344	3.772		Site 1/Adult Mean
1A94	42.174	4.260		4.552
1A95	46.837	4.731		
1A96	48.032	4.851		Standard Deviation
1A97	59.471	6.007		1.131551754
1A98	65.419	6.607		
1A99	73.167	7.390		Standard Error
1A100	42.994	4.342		0.2066
1A101	35.421	3.578		
1A102	33.167	3.350		n=30
1A103	46.627	4.709		
1A104	63.753	6.439		
1A105	32.250	3.257		
1A106	21.305	2.152		
1A107	44.514	4.496		
1A108	40.276	4.068		
1A109	40.966	4.138		
1A110	44.741	4.519		
1A111	50.833	5.134		
1A112	44.436	4.488		
1A113	47.516	4.799		
1A114	37.893	3.827		
1A115	49.302	4.979		
1A116	40.601	4.101		
1A117	50.135	5.064		
1A118	42.209	4.263		
1A119	49.319	4.981		
1A120	52.955	5.348		
1B91	33.773	3.411		Site 1/Juvnl Mean
1B92	44.936	4.539		3.942
1B93	50.529	5.103		
1B94	43.154	4.359		Standard Deviation
1B95	42.927	4.336		0.637773712
1B96	25.777	2.603		
1B97	31.488	3.180		Standard Error
1B98	40.847	4.126		0.1594
1B99	42.467	4.289		
1B100	37.870	3.825		n=16
1B101	37.276	3.765		

1B102	44.855	4.530		
1B103	34.205	3.455		
1B104	41.990	4.241		
1B105			no plasma	
1B106	31.886	3.220		
1B107	40.479	4.088		
2A91	25.796	2.605		Site 2/Adult Mean
2A92	50.479	5.098		4.401
2A93	27.204	2.748		
2A94	33.692	3.403		Standard Deviation
2A95	48.925	4.941		0.957620946
2A96	37.248	3.762		
2A97	40.454	4.086		Standard Error
2A98	53.001	5.353		0.1748
2A99	48.211	4.869		
2A100	27.890	2.817		n=30
2A101	35.398	3.575		
2A102	48.386	4.887		
2A103	31.368	3.168		
2A104	52.482	5.301		
2A105	56.636	5.720		
2A106	43.705	4.414		
2A107	47.045	4.752		
2A108	22.914	2.314		
2A109	53.083	5.361		
2A110	44.663	4.511		
2A111	37.919	3.830		
2A112	47.964	4.844		
2A113	46.511	4.698		
2A114	42.906	4.334		
2A115	48.412	4.890		
2A116	49.723	5.022		
2A117	45.240	4.569		
2A118	53.002	5.353		
2A119	50.918	5.143		
2A120	56.074	5.663		
2B91	46.506	4.697		Site 2/Juvnl Mean
2B92	40.597	4.100		4.403
2B93	50.747	5.125		
2B94	50.685	5.119		Standard Deviation
2B95	40.615	4.102		0.658640296
2B96	57.456	5.803		
2B97	44.230	4.467		Standard Error
2B98	41.895	4.231		0.1268
2B99	45.032	4.548		
2B100			no plasma	n=27

2B101	37.498	3.787		
2B102	47.832	4.831		
2B103	40.121	4.052		
2B104	38.760	3.915		
2B105	53.998	5.454		
2B106	55.482	5.604		
2B107	39.195	3.959		
2B108	38.235	3.862		
2B109	41.280	4.169		
2B110	43.945	4.438		
2B111	30.978	3.129		
2B112	43.535	4.397		
2B113	44.504	4.495		
2B114	35.985	3.634		
2B115	36.401	3.677		
2B116	40.912	4.132		
2B117	52.510	5.303		
2B118	38.083	3.846		

Protein Determination - San Juan River
August 2001

Sample Number	Diluted Concn mg/dL	Actual Concn g/dL	Comments	Mean Concn for each size/site group
1A121	62.493	6.312		
1A122	67.695	6.837		Site 1/Adult Mean
1A123	56.647	5.721		5.643
1A124	55.371	5.592		
1A125	66.748	6.742		Standard Deviation
1A126	40.000	4.040		1.414048508
1A127	46.832	4.730		
1A128	49.286	4.978		Standard Error
1A129	55.772	5.633		0.2582
1A130	55.245	5.580		
1A131	88.839	8.973		n=30
1A132	43.783	4.422		
1A133	67.432	6.811		
1A134	39.171	3.956		
1A135	45.512	4.597	light hemolysis	
1A136	46.197	4.666	light hemolysis	
1A137	74.081	7.482		
1A138	48.447	4.893		
1A139	45.526	4.598		
1A140	49.014	4.950		
1A141	96.549	9.751		
1A142	49.532	5.003		
1A143	55.167	5.572		
1A144	56.621	5.719		
1A145	38.331	3.871		
1A146	41.058	4.147		
1A147	51.393	5.191		
1A148	47.646	4.812		
1A149	71.034	7.174		
1A150	64.610	6.526		
1B121	50.829	5.134		Site 1/Juvnl Mean
1B122	46.580	4.705	hemolysis	4.192
1B123	43.352	4.379		
1B124	47.540	4.802	light hemolysis	Standard Deviation
1B125	40.579	4.098	25 uL, light hemo	0.669230717
1B126	34.481	3.483		
1B127	40.147	4.055		Standard Error
1B128	43.379	4.381	hemolysis	0.1243
1B129	37.812	3.819	25 uL, light hemo	
1B130	45.709	4.617		n=29
1B131	36.091	3.645	25 uL	

1B132	44.490	4.493		
1B133	39.358	3.975	25 uL, light hemo	
1B134	45.705	4.616	25 uL, light hemo	
1B135	42.099	4.252		
1B136	45.503	4.596	25 uL, light hemo	
1B137	37.523	3.790		
1B138	40.565	4.097	25 uL, light hemo	
1B139	32.521	3.285	25 uL, light hemo	
1B140	54.649	5.520		
1B141	41.586	4.200	clotted	
1B142	55.953	5.651		
1B143			not enough plasma	
1B144	25.589	2.584		
1B145	45.264	4.572		
1B146	42.261	4.268		
1B147	34.004	3.434		
1B148	41.324	4.174		
1B149	36.053	3.641		
1B150	32.554	3.288		
2A121	33.109	3.344		Site 2/Adult Mean
2A122	51.898	5.242		5.417
2A123	56.670	5.724		
2A124	39.718	4.012		Standard Deviation
2A125	48.841	4.933		1.544122911
2A126	50.936	5.145		
2A127	60.052	6.065		Standard Error
2A128	48.222	4.870		0.2819
2A129	45.624	4.608	hemolysis	
2A130	81.177	8.199	light hemolysis	n=30
2A131	77.625	7.840		
2A132	60.479	6.108		
2A133	39.486	3.988		
2A134	64.344	6.499		
2A135	63.153	6.378		
2A136	59.273	5.987		
2A137	66.954	6.762		
2A138	76.948	7.772		
2A139	66.231	6.689		
2A140	38.035	3.842		
2A141	77.853	7.863		
2A142	32.545	3.287		
2A143	52.496	5.302		
2A144	15.106	1.526		
2A145	38.111	3.849		
2A146	46.754	4.722		
2A147	46.487	4.695		

2A148	46.822	4.729		
2A149	62.099	6.272		
2A150	62.029	6.265		
2B121	38.757	3.914	25 uL, heavy particl	Site 2/Juvnl Mean
2B122	41.761	4.218		4.612
2B123	41.285	4.170		
2B124	46.412	4.688	25 uL, light hemo	Standard Deviation
2B125	37.983	3.836		0.616095768
2B126	43.053	4.348	light hemolysis	
2B127	43.205	4.364	hemolysis	Standard Error
2B128	43.383	4.382	25 uL, light hemo	0.1125
2B129	44.659	4.511	light hemolysis	
2B130	38.859	3.925	25 uL, light hemo	n=30
2B131	54.218	5.476	hemolysis	
2B132	43.664	4.410	25 uL, hemolysis	
2B133	45.071	4.552		
2B134	45.645	4.610		
2B135	44.602	4.505		
2B136	41.806	4.222		
2B137	53.049	5.358		
2B138	57.302	5.788		
2B139	40.594	4.100		
2B140	45.462	4.592		
2B141	40.665	4.107		
2B142	35.305	3.566		
2B143	58.704	5.929		
2B144	44.744	4.519		
2B145	54.299	5.484		
2B146	43.817	4.426	hemolysis	
2B147	57.296	5.787		
2B148	50.954	5.146		
2B149	49.531	5.003		
2B150	43.833	4.427	hemolysis	

ATTACHMENT C

Percent Muscle Lipid Extraction Procedure (Wet Weight)

Procedure

Epaxial fish muscle is dried and muscle lipids are extracted with methylene chloride and determined gravimetrically.

Materials Needed

50 mL beakers (prelabeled), 50 mL burets and teflon stopcocks, buret stands and clamps, glass wool, heavy duty aluminum foil, pestle, funnel, methylene chloride (approximately 50 mL per sample), sodium sulfate (approximately 2 g per sample), drying oven, fume hood, and scale.

Set-Up

Prior to lipid extraction procedure, take one 50 mL beaker for each sample and heat for 20-30 minutes at 90°C then cool in desiccator for 20 minutes. Record the weights for each beaker to the nearest 0.5 mg. Repeat this procedure until the difference between successive weighing is less than 0.5 mg.

1. Thaw the muscle tissue until it is at room temperature. Weigh aluminum foil (doubled with shiny side inside and marked with specimen I.D.). The weight of the clean foil needs to be noted for later calculations. Tare scale, remove tissue from cryovial, place on foil and weigh to nearest 0.5 mg (mass of wet tissue). Care should be taken to eliminate bone, blood, scales and skin. Dry tissue for 12 hours at 60°C.

2. After drying, cool tissue and weigh dry tissue and foil. Subtract original clean foil weight to determine mass of dry tissue. Fold all four sides of the foil around the tissue and pulverize the tissue with a pestle.

3. Add approximately 2 cm of glass wool at the base of the buret nearest the stopcock, and setup burets on buret stands. Using a funnel, pour approximately 1 cm of sodium sulfate into the buret above the glass wool. This will act as an additional dehydrant to water remaining in the tissue.

4. Add the dry tissue to the buret. Add approximately 1 cm of sodium sulfate above the tissue layer. Then rinse the foil and inside of funnel with approximately 5.0 mL methylene chloride into buret to remove all remaining tissue (do not rinse before placing the sodium sulfate into buret as this causes the tissue to bubble up on top of the sodium sulfate). Place a labeled 50 mL beaker under each buret.

5. Record the beaker number used for each muscle specimen.

6. Open the stopcock carefully to allow the methylene chloride to run through the tissue and sodium sulfate layers and into the glass wool, then close stopcock. Allow the methylene chloride to soak the tissue for 1 hour.

7. After soaking, pour methylene chloride into the buret up to the 45 mL mark. Open stopcock and allow methylene chloride to drip at approximately 1 mL per minute into the 50 mL beaker. The lipids will be collected in the beaker in the solvent phase.

8. Allow the beakers containing the solvent to evaporate in a fume hood (12-15 hours).

9. After all solvent has evaporated, place beakers in the drying oven at 90°C for 2 hours. Allow beakers to cool in desiccator for 25 minutes, then weigh and record the weights to the nearest 0.5 mg.

10. Repeat step 10 until the difference between successive weighing is less than 0.5 mg. Subtract the clean beaker weight from the lipid beaker weight for lipid mass after extraction.

11. Calculation for percent muscle lipid (wet weight): (Lipid mass after extraction/Mass of wet tissue) x 100.

12. Calculation for percent moisture: (Mass of wet tissue - Mass of dry tissue/Mass of wet tissue) x 100.

San Juan River Fish Health Assessment -- Percent Muscle Lipid and Moisture

October 2000

Adult - Site 1			**Adult - Site 2**			**Juvenile - Site 1**			**Juvenile - Site 2**		
Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture
1A01	0.1257	82.77	2A01	0.5713	76.12	1B01	3.3491	75.62	2B01	4.7012	72.37
1A02	1.4110	74.48	2A02	0.1511	78.88	1B02	0.8770	75.88	2B02	3.2577	74.41
1A03	0.9385	74.57	2A03	0.1241	78.40	1B03	0.7211	77.15	2B03	3.9651	73.65
1A04	1.0911	76.77	2A04	0.6665	73.37	1B04	0.8618	77.46	2B04	0.4103	78.95
1A05	0.1735	78.94	2A05	1.2406	75.58	1B05	2.0669	76.11	2B05	2.1876	77.13
1A06	1.9969	74.77	2A06	1.7766	75.38	1B06	0.8505	77.35	2B06	0.6999	77.62
1A07	0.9352	75.83	2A07	0.5343	75.02	1B07	0.7024	78.89	2B07	0.4784	76.69
1A08	0.6307	76.00	2A08	1.0179	77.33	1B08	1.4670	76.41	2B08	2.6192	75.43
1A09	1.0648	75.88	2A09	0.7443	77.64	1B09	1.0159	78.36	2B09	3.6846	74.20
1A10	0.4379	75.94	2A10	0.2191	77.33	1B10	1.4882	76.99	2B10	0.5033	77.23
1A11	0.1851	77.08	2A11	0.7261	77.54	1B11	1.0139	77.11	2B11	0.9723	76.12
1A12	0.6254	77.32	2A12	0.4851	76.62	1B12	1.4113	77.76	2B12	0.2618	86.63
1A13	0.3357	76.15	2A13	0.8211	75.52	1B13	0.8205	76.80	2B13	0.6550	75.36
1A14	0.1266	78.20	2A14	0.1989	78.89	1B14	1.4125	76.18	2B14	1.1901	77.47
1A15	0.1505	76.80	2A15	0.3907	76.17	1B15	1.6101	74.98	2B15	0.7214	76.56
1A16	0.0968	81.21	2A16	0.7978	77.33	1B16	2.0243	76.18	2B16	0.4336	78.52
1A17	0.1975	86.05	2A17	0.2163	75.73	1B17	0.9436	78.25	2B17	2.5874	76.01
1A18	0.3276	76.18	2A18	0.9072	76.17	1B18	1.4413	75.75	2B18	3.2382	73.35
1A19	0.3718	76.46	2A19	0.1681	77.38	1B19	1.1311	76.27	2B19	2.6456	74.12
1A20	0.1691	75.98	2A20	1.1390	75.81	1B20	1.0804	75.31	2B20	0.8949	76.22
1A21	0.6925	75.93	2A21	0.1102	77.53	1B21	0.6441	77.67	2B21	0.9151	76.57
1A22	0.1924	76.33	2A22	2.6032	73.74				2B22	1.1337	75.16
1A23	1.3886	74.21	2A23	0.4832	74.70				2B23	0.5822	77.88
1A24	1.1245	76.11	2A24	0.1828	78.02						
1A25	1.7632	74.87	2A25	1.4111	75.31						
1A26	0.3340	76.78	2A26	2.0944	75.81						
1A27	0.6138	75.60	2A27	3.4839	74.34						
1A28	0.0945	83.10	2A28	0.4336	76.95						
1A29	0.5581	73.79	2A29	0.8138	74.18						
1A30	0.2879	76.71	2A30	2.1556	74.52						
1A Mean	0.6147	77.0267	**2A Mean**	0.8889	76.2438	**1B Mean**	1.2825	76.7837	**2B Mean**	1.6843	76.4199
Std Err	0.0957	0.5112		0.1488	0.2732		0.1363	0.2295		0.2831	0.5841
Std Dev.	0.52	2.80		0.81	1.50		0.62	1.05		1.36	2.80

San Juan River Fish Health Assessment -- Percent Muscle Lipid and Moisture

December 2000

Adult - Site 1			Adult - Site 2			Juvenile - Site 1			Juvenile - Site 2		
Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture
1A31	1.6054	73.77	2A31	0.7320	75.58	1B31	0.2679	77.79	2B31	0.4516	76.20
1A32	0.5482	76.42	2A32	0.6888	76.14	1B32	0.6758	77.26	2B32	0.1697	76.40
1A33	0.4382	78.35	2A33	0.1323	77.84	1B33	2.2290	74.59	2B33	0.6640	76.32
1A34	0.6038	77.29	2A34	1.2126	76.26	1B34	0.4863	78.07	2B34	0.3824	76.47
1A35	0.2261	77.47	2A35	0.4349	76.47	1B35	0.2661	78.35	2B35	0.6260	76.72
1A36	0.7430	76.85	2A36	0.8611	76.08	1B36	0.7522	76.74	2B36	0.3872	77.36
1A37	0.3206	76.43	2A37	0.4141	78.45	1B37	0.4175	77.62	2B37	1.3876	76.00
1A38	0.4840	77.33	2A38	0.9860	74.66	1B38	0.3763	76.48	2B38	0.4269	76.18
1A39	0.7770	75.99	2A39	0.1314	79.96	1B39	0.1382	77.34	2B39	0.2960	77.97
1A40	0.7472	75.21	2A40	0.1738	78.16	1B40	1.1441	75.77	2B40	0.4351	75.59
1A41	0.4936	67.28	2A41	0.4112	78.01	1B41	0.6490	75.25	2B41	0.2976	76.37
1A42	2.7024	75.07	2A42	0.4036	75.91	1B42	0.2466	80.77	2B42	0.8445	76.67
1A43	0.1698	79.37	2A43	1.0705	76.24	1B43	1.1179	76.52	2B43	0.5548	76.28
1A44	0.7165	76.29	2A44	0.3565	75.23	1B44	0.4393	77.08	2B44	0.4861	76.37
1A45	0.9817	74.74	2A45	0.6647	75.49	1B45	0.2797	78.20	2B45	0.6282	75.94
1A46	0.8703	83.80	2A46	1.8604	74.36	1B46	0.3112	78.11	2B46	0.7322	77.41
1A47	0.8900	75.60	2A47	0.7872	74.99	1B47	0.4322	76.58	2B47	0.8444	77.21
1A48	1.1175	75.00	2A48	0.3037	78.77	1B48	0.4655	75.98	2B48	0.8894	77.31
1A49	0.8994	75.10	2A49	0.5074	77.10	1B49	0.4224	77.46	2B49	0.3610	77.09
1A50	0.5058	75.26	2A50	0.5408	77.40	1B50	0.7911	77.33	2B50	0.2979	77.91
1A51	0.2909	76.45	2A51	0.5766	75.95	1B51	0.4100	77.00	2B51	0.5417	77.19
1A52	0.8967	76.81	2A52	0.1211	80.59	1B52	0.3944	78.43	2B52	0.3898	77.84
1A53	0.8092	75.44	2A53	0.6036	75.30	1B53	0.5894	75.00	2B53	0.8798	77.13
1A54	1.2216	75.35	2A54	0.6003	75.70	1B54	0.2452	77.77	2B54	0.6012	77.81
1A55	0.2275	76.45	2A55	1.1307	74.86	1B55	0.6936	77.41	2B55	1.5868	76.84
1A56	0.1549	78.21	2A56	1.0715	73.94	1B56	1.1556	76.90	2B56	1.3702	76.69
1A57	0.4979	75.39	2A57	0.7280	78.38	1B57	0.4702	76.08			
1A58	1.2359	75.49	2A58	0.3667	75.80	1B58	0.7745	76.65			
1A59	0.1005	77.69	2A59	0.1876	84.15	1B59	0.9554	77.58			
1A60	0.3236	76.50	2A60	0.6490	77.18	1B60	1.1110	77.46			
1A Mean	0.7200	76.21	**2A Mean**	0.6236	76.83	**1B Mean**	0.6236	77.12	**2B Mean**	0.6358	76.82
Std Err	0.0953	0.4551		0.0707	0.3886		0.0771	0.2183		0.0654	0.1209
Std Dev.	0.52	2.49		0.39	2.13		0.42	1.20		0.36	0.66

San Juan River Fish Health Assessment -- Percent Muscle Lipid and Moisture

January 2001

Adult - Site 1			Adult - Site 2			Juvenile - Site 1			Juvenile - Site 2		
Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture
1A61	0.5649	76.98	2A61	0.6536	76.36	1B61	1.0409	75.66	2B61	0.6068	75.70
1A62	1.5294	74.73	2A62	0.8486	75.80	1B62	0.3921	76.98	2B62	0.9056	72.28
1A63	0.8698	75.32	2A63	0.7477	77.43	1B63	0.9135	77.48	2B63	0.4981	77.55
1A64	0.7245	76.07	2A64	0.9655	75.96	1B64	1.2226	77.09	2B64	0.3700	75.46
1A65	2.3063	75.34	2A65	0.8812	76.85	1B65	0.9283	77.01	2B65	0.8760	76.72
1A66	0.8267	76.99	2A66	2.9729	73.62	1B66	0.5145	76.66	2B66	0.6853	75.74
1A67	0.1782	79.59	2A67	1.3578	74.83	1B67	0.4486	75.82	2B67	0.5785	77.08
1A68	0.3164	77.10	2A68	1.5182	74.54	1B68	0.4030	76.58	2B68	1.0728	76.08
1A69	0.7676	76.98	2A69	0.3370	77.09	1B69	1.1281	75.88	2B69	0.5739	76.96
1A70	0.9648	76.29	2A70	0.5119	77.05	1B70	0.6715	77.13	2B70	0.8053	76.63
1A71	2.4799	73.00	2A71	0.2775	77.34	1B71	0.6979	75.03	2B71	0.7013	76.98
1A72	0.4230	76.90	2A72	0.2568	76.85	1B72	1.2895	76.40	2B72	0.5856	77.51
1A73	0.2567	77.13	2A73	0.7431	76.20	1B73	0.3986	75.22	2B73	0.8951	77.28
1A74	0.2617	87.49	2A74	1.9249	74.38	1B74	0.5720	77.52	2B74	0.8229	77.82
1A75	0.2240	78.16	2A75	0.2938	77.37	1B75	0.8943	77.12	2B75	0.6359	78.31
1A76	0.3638	74.29	2A76	0.2559	79.38	1B76	0.5580	73.54	2B76	0.8898	76.85
1A77	2.5652	74.81	2A77	1.0143	75.41	1B77	1.0789	76.50	2B77	1.1372	77.24
1A78	0.5036	76.45	2A78	0.9196	75.37	1B78	2.2369	76.37	2B78	1.0835	75.76
1A79	0.6125	75.64	2A79	0.5992	75.23	1B79	1.7609	76.49	2B79	0.4908	77.58
1A80	0.3954	76.52	2A80	0.9441	74.36	1B80	0.7711	73.00	2B80	1.2099	75.86
1A81	1.5032	74.86	2A81	0.5636	76.46	1B81	1.0622	76.72	2B81	1.7747	74.16
1A82	0.5295	75.54	2A82	1.9085	75.46	1B82	0.9841	76.11	2B82	0.9820	74.28
1A83	0.6565	74.56	2A83			1B83	0.5225	76.91	2B83		
1A84	0.2864	77.87	2A84	0.7269	75.32	1B84	0.5481	77.32	2B84	1.3988	75.86
1A85	0.5068	72.12	2A85	0.4170	74.64	1B85	0.9417	75.15	2B85	1.3119	76.92
1A86	0.6375	75.16	2A86	0.2173	78.50	1B86	0.8176	77.22	2B86	0.9372	77.38
1A87	0.9144	79.88	2A87	1.4354	75.08	1B87	0.4241	77.86	2B87	1.9644	76.61
1A88	0.5440	75.24	2A88	1.4694	73.86	1B88	0.4469	77.70	2B88	0.6101	74.93
1A89	0.4569	75.66	2A89	1.7995	75.43	1B89	0.5760	77.74	2B89	0.7255	78.37
1A90	0.2009	78.70	2A90	0.7037	75.34	1B90			2B90	0.9171	75.07
1A Mean	0.7790	76.51	**2A Mean**	0.9402	75.91	**1B Mean**	0.8360	76.42	**2B Mean**	0.8981	76.38
Std Err.	0.1198	0.4915		0.1169	0.2485		0.0776	0.2129		0.0675	0.2465
Std Dev.	0.66	2.69		0.64	1.36		0.43	1.17		0.37	1.35

San Juan River Fish Health Assessment -- Percent Muscle Lipid and Moisture

March 2001

Adult - Site 1			**Adult - Site 2**			**Juvenile - Site 1**			**Juvenile - Site 2**		
Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture
1A091	1.1092	75.02	2A091	0.2127	79.23	1B091	0.4608	76.63	2B091	0.6539	76.90
1A092	0.1994	86.59	2A092	0.7507	75.18	1B092	0.6333	75.52	2B092	0.5988	77.95
1A093	0.5785	76.68	2A093	0.4155	79.71	1B093	0.6242	76.86	2B093	0.8211	78.00
1A094	0.4845	77.96	2A094	0.5455	77.22	1B094	0.5543	75.31	2B094	0.8819	76.77
1A095	0.3296	75.80	2A095	1.0055	74.95	1B095	0.3225	76.61	2B095	0.6273	78.41
1A096	0.7075	76.09	2A096	0.2548	79.58	1B096	0.7999	77.78	2B096	1.8864	76.81
1A097	0.8342	75.13	2A097	1.0608	76.95	1B097			2B097	0.5581	76.68
1A098	0.4802	75.00	2A098	2.2899	74.52	1B098	0.3998	76.62	2B098	0.6898	76.23
1A099	0.6974	76.71	2A099	0.4800	77.32	1B099			2B099	1.1911	75.82
1A100	0.3899	76.07	2A100	0.1852	79.18	1B100	0.5066	76.83	2B100	1.2051	77.42
1A101	0.3275	76.57	2A101	0.2668	78.19	1B101	0.4928	77.80	2B101	0.4169	77.59
1A102	0.9719	76.64	2A102	0.5595	76.14	1B102	0.8102	74.65	2B102	0.8285	75.81
1A103	0.4336	74.73	2A103	0.0563	78.65	1B103	1.6494	75.60	2B103	0.8780	75.61
1A104	0.7902	75.13	2A104	1.0711	74.85	1B104	1.1287	77.52	2B104	0.6801	76.73
1A105	0.3384	74.88	2A105	1.3025	74.58	1B105	0.4303	78.68	2B105	0.5546	78.12
1A106	0.2226	80.62	2A106	0.6335	77.75	1B106	0.2462	77.91	2B106	0.9904	78.18
1A107	0.6010	75.91	2A107	0.4676	75.49	1B107	1.2798	75.73	2B107	0.4585	77.61
1A108	0.7279	77.87	2A108	0.1993	81.03				2B108	0.5503	77.13
1A109	0.3923	75.30	2A109	0.6189	75.53				2B109	0.3245	78.28
1A110	0.6292	75.93	2A110	0.9023	76.79				2B110	0.5795	77.30
1A111	0.8629	75.42	2A111	0.8007	77.39				2B111	0.7256	78.29
1A112	0.7898	75.24	2A112	0.6070	74.89				2B112	0.4624	78.43
1A113	0.3988	77.65	2A113	0.7835	73.91				2B113	0.6009	77.65
1A114	0.2136	78.63	2A114	1.5746	73.63				2B114	0.4407	77.12
1A115	1.0077	75.08	2A115	0.9320	75.40				2B115	0.8285	78.11
1A116	0.3277	76.78	2A116	0.5152	75.32				2B116	1.4833	76.59
1A117	1.3850	74.48	2A117	0.5041	75.70				2B117	1.2147	77.07
1A118	0.5767	78.43	2A118	0.6883	74.50				2B118	0.6967	77.78
1A119	0.8877	75.68	2A119	0.5161	75.87						
1A120	0.1619	77.49	2A120	2.3787	74.11						
1A Mean	0.5952	76.65	**2A Mean**	0.7526	76.45	**1B Mean**	0.6893	76.67	**2B Mean**	0.7796	77.30
Std. Err	0.0548	0.4278		0.1004	0.3616		0.0973	0.2844		0.0662	0.1562
Std Dev.	0.30	2.34		0.55	1.98		0.39	1.14		0.35	0.83

San Juan River Fish Health Assessment -- Percent Muscle Lipid and Moisture

August 2001

Adult - Site 1			**Adult - Site 2**			**Juvenile - Site 1**			**Juvenile - Site 2**		
Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture	Specimen I.D.	Percent Lipid	Percent Moisture
1A121	2.7859	73.61	2A121	0.2636	85.59	1B121	0.8480	76.17	2B121	1.0642	78.46
1A122	1.6934	76.58	2A122	1.1938	75.77	1B122	0.5228	85.36	2B122	1.8884	75.26
1A123	1.7629	74.48	2A123	1.8000	75.70	1B123			2B123	2.9277	77.69
1A124	1.1967	74.11	2A124	0.9368	75.87	1B124	1.6524	78.19	2B124	0.9450	83.92
1A125	2.3948	73.99	2A125	2.1534	82.91	1B125	0.8188	75.86	2B125	0.9617	78.97
1A126	0.3761	77.70	2A126	1.3598	74.13	1B126	1.1528	78.33	2B126	2.7510	77.37
1A127	1.8422	74.24	2A127	1.4906	76.17	1B127	1.0560	77.41	2B127	1.0656	76.52
1A128	1.7199	74.26	2A128	2.4916	73.80	1B128	0.9908	79.33	2B128	1.2861	78.99
1A129	1.1692	75.09	2A129	1.0649	76.51	1B129	0.8151	83.25	2B129	1.8902	77.85
1A130	0.8472	76.16	2A130	0.9164	74.51	1B130	1.2706	76.65	2B130	1.5013	78.35
1A131	1.3115	73.96	2A131	0.7688	75.76	1B131	0.9040	78.38	2B131	1.0676	78.12
1A132	1.3544	75.53	2A132	1.2923	84.79	1B132	1.0372	77.37	2B132	0.9640	86.03
1A133	1.2640	73.84	2A133	1.2760	76.20	1B133	1.3674	78.28	2B133	1.4513	77.48
1A134	0.4427	77.25	2A134	1.0680	77.76	1B134	1.9854	77.99	2B134	2.3414	77.96
1A135	2.5571	73.71	2A135	2.0057	77.43	1B135	0.9460	77.71	2B135	1.8138	77.17
1A136	2.4311	70.43	2A136	1.3980	77.09	1B136	1.5208	78.06	2B136	0.6729	78.69
1A137	2.2333	74.98	2A137	0.9878	87.87	1B137	2.2546	76.25	2B137	1.7683	76.73
1A138	0.9050	76.40	2A138	0.6359	78.16	1B138	0.5547	78.93	2B138	1.7235	76.65
1A139	4.4047	72.96	2A139	1.7415	75.32	1B139	1.1163	78.18	2B139	0.8965	86.08
1A140	0.8600	77.15	2A140	1.0483	75.77	1B140	1.5461	76.49	2B140	0.9933	85.67
1A141	3.1205	74.11	2A141	2.4633	75.84	1B141	1.5072	77.34	2B141	1.1825	77.21
1A142	0.4294	73.68	2A142	0.2839	82.20	1B142	1.1463	76.36	2B142	0.5365	78.31
1A143	1.1581	75.96	2A143	3.3142	74.52	1B143	2.3791	77.20	2B143	1.5328	76.01
1A144	1.3665	74.36	2A144	0.3546	83.63	1B144	1.3067	79.33	2B144	1.4046	76.12
1A145	0.6790	77.51	2A145	1.3879	75.56	1B145	1.5936	77.35	2B145	0.6879	84.37
1A146	0.2223	78.66	2A146	0.6343	76.70	1B146	1.2992	78.32	2B146	2.2521	75.94
1A147	0.6166	73.72	2A147	2.6902	76.21	1B147	1.9943	76.26	2B147	2.3970	75.23
1A148	0.5326	83.87	2A148	0.3720	79.27	1B148	1.5010	77.06	2B148	1.1697	75.91
1A149	1.4805	75.60	2A149	1.1662	76.55	1B149	1.1956	78.45	2B149	2.6667	75.25
1A150	1.3761	67.29	2A150	2.5753	74.79	1B150	0.9796	78.51	2B150	1.3678	78.90
1A Mean	1.4845	75.04	**2A Mean**	1.3712	77.75	**1B Mean**	1.2849	78.08	**2B Mean**	1.5057	78.57
Std Err	0.1712	0.5039		0.1421	0.6793		0.0857	0.3697		0.1184	0.5916
Std Dev.	0.94	2.76		0.78	3.72		0.46	1.99		0.65	3.24