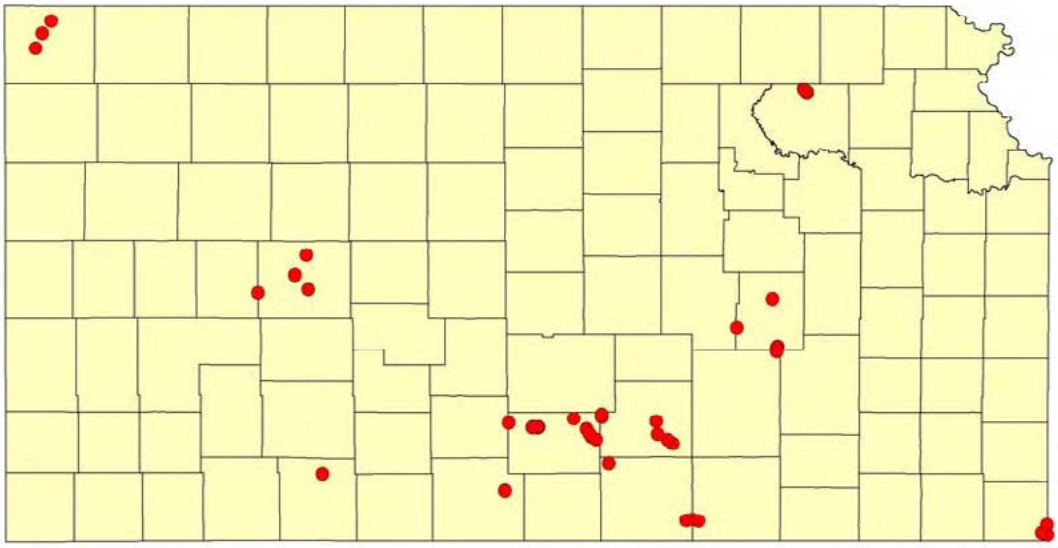
Kansas Department of Wildlife & Parks
Stream Monitoring and Assessment Program

RFM 2007 LANDOWNER SURVEY
SITE SUMMARIES

February 2008



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RFM (Rare Fish & Mussels) 2007 GENERAL PROTOCOLS

SITE SELECTION:

Site selection consisted of areas that contain or historically inhabited rare fish or mussel species. Clear Fork Creek sites in Pottawatomie county were five surveys conducted to record the affects on Topeka shiners (*Notropis topeka)* after a new bridge and stream alignment in the spring of 2006. This was the fourth year of the five years monitoring of this project. Five sites on Smoots Creek, Kingman county, were the third year of a five year study on the affects of an ammonia pipeline break in winter of 2004. Six sites located on South Fork Ninnescah River, Kingman county, Byron Walker Wildlife Area, were to monitor the affects of a bank stabilization and a weir project near the highway bridges on the wildlife area. This was the first survey of a five year monitoring plan to examine the affects on the aquatic community from the stabilization projects. The remainder of the sites were selected using aerial photos in ArcMap and finding locations that may contain the best habitat for the fish or mussel species being surveyed. After gaining landowner permission in the spring, the site would be surveyed during the summer at or close to seasonal flow. When arriving at the site the best possible habitat on the stream was selected to conduct the survey. In addition, the amount of sample site wadeable (chest waders) was also taken into consideration.

SITE SETUP:

The length of the survey site is determined by taking 10 stream widths over a 100 meter stretch and calculating the average then take that times 40. Maximum survey length is 300 meters and the minimum is 150 meters. The determined site length is divided by 10 and 11 transects are placed along the edge of the stream. A-transect is at the downstream end and K is at the upstream end. F-transect is the middle of the survey reach. Each end of the survey site has a 1-inch mesh block off net placed across the stream where applicable.

WATER CHEMISTRY:

A water sample is first collected before any disturbance occurs in the stream. Twelve water chemistry parameters are recorded at the site using a HACH spectrophotometer, digital titrator and a SensION meter.

GPS POINT:

A GPS point is recorded in decimal degrees at the F-transect on either the right or left bank. Elevation, weather, and precision error are also recorded.

FISH COMMUNITY SAMPLING:

The stream reach is usually electrofished with one pass depending on the width of the stream. Equipment used is either a back-pack unit or a tote barge electrofishing system. All available habitats are electrofished and the amount of time electrofished is recorded. After the site is electrofished the stream is seined, usually one pass, depending on the width of the stream. The types of seines used: 15 foot straight seine with 3/16″ mesh, 18 foot bag seine with 6 foot bag made up of 1/8″ mesh and 3/16″ mesh wings, 30 foot bag seine with 6 foot bag made up of 1/8″ mesh and 3/16″ mesh wings. The proper size seine is used to best utilize for size of the stream. Riffles are often kick-seined and the amount of time seining is also recorded.

Fish collected are kept in floating cages until the fish sampling is completed. The bigger, more easily identified fish, are identified, measured according to the Gablehouse index, then released. Fish that are threatened, endangered or in need of conservation are counted and released at the site. Smaller less identifiable fish are preserved in 10% formalin and brought back to the Aquatic Research Resources Facility at the Pratt Operations headquarters. Here they are identified, vouchered, and then cataloged into the Stream Monitoring Program database. Half of the individuals of each species from every site are sent to Fort Hays State University for quality assurance and then vouchered into the Sternberg Museum of Natural History. Any exclusively unidentifiable individuals are also sent to Fort Hays State University for further identification or confirmation.

MACROINVERTEBRATE COMMUNITY SAMPLING:

Macroinvertebrates are collected at the nine interior transects using a 500 micron D-frame net. The collections are made in a zigzag pattern along the survey site at each transect. For example, first sample made at B-transect is on left bank then the sample at C-transect is in the middle, then D-transect sample is on right bank then back to the middle for E-transect, continuing this pattern for the rest of the interior transects. The collecting method used is placing the D-frame net on the bottom of the stream facing upstream. The substrate is then kicked or stirred up in front of the net allowing any debris and substrate to flow in the net then the net is swept over the area as it is being removed. Samples are placed in buckets keeping the pool and riffle habitats separate. After all nine collections are made; macroinvertebrates are removed from the sample media with tweezers and preserved in 50% ethyl alcohol in the appropriate habitat jar.

A HDI (Habitat Development Index) is also conducted while collecting the macroinvertebrates. This is a habitat score made up of seven metrics given to each macrohabitat type: pool, riffle, run. The HDI score is the sum of the total scores of each unique macrohabitat sampled. Twenty minutes for one individual is spent collecting macroinvertebrates at each of these macrohabitat types. All

macroinvertebrates are preserved in a jar labeled HDI containing 50% ethyl alcohol. Macroinvertebrate specimens are brought back to the Aquatic Research Resources Facility at the Pratt Operations headquarters to be identified to the family level. The only voucher specimens kept are for a resource library to help aid identification. The quality assurance is based upon the experience, knowledge, and macroinvertebrate resources of the biologists at the facility for any questionable specimens. The identified specimens from each site are entered into the Stream Monitoring Program database.

PHYSICAL HABITAT DATA COLLECTION:

The physical habitat assessment parameter is used to examine all the physical attributes that influence or provide sustenance to organisms within the stream. Four different components make up the physical habitat assessment, these consists of the thalweg profile, woody debris count, stream channel/riparian cross-sections, and stream discharge.

The first component, the thalweg profile, is a longitudinal survey of the maximum stream channel depth, habitat class, and presence of fine/soft sediment at ten or 15 equally spaced intervals between each of the 11 transects.

The second component is a count of woody debris according to size and location within bankfull and above the bankfull channel. This observation is made between transects.

The third component consists of measurements of the stream channel and riparian cross-sections. The substrate and stream channel dimensions are measured by taking a wetted width measurement at each transect and dividing this measurement by four, creating five equal points across the stream. At each point, a measurement is recorded of the stream depth, substrate type, size, and embeddedness.

At each transect, boundaries are applied to the right and left bank riparian area and the stream for visual estimating of fish cover, human influences, and riparian vegetation. The boundaries at each transect are upstream five meters, downstream five meters and a visual area perpendicular to the stream a distance of ten meters. The fish cover at each transect is a visual estimate that evaluates the type and amount of cover for fish and macroinvertebrates. Human influence is a visual evaluation of the presence and proximity of a variety of human land use activities inside and outside the stream riparian area. Another visual estimate is the evaluation of the type and amount of riparian vegetation. This estimate measures the health and level of disturbance of the stream corridor.

The vegetative cover is measured at each transect with a convex spherical densiometer. Measurements are made separately in four directions at the center of the stream and one measurement at the left and right edge water

facing the riparian vegetation. Seventeen intersections are observed on the densiometer and the count (0-17) is recorded. This value consists of all the intersections on the densiometer that have vegetation covering them.

Bank characteristics are measured at each transect on the right and left bank. The characteristics consist of bank angles, undercut, and the incision. The bank angle is measured by laying a clinometer on a meter stick placed perpendicular to the water's edge and measure the angle in degrees. If a bank is undercut, the horizontal distance of the undercut perpendicular to the stream is measured. Also, a measurement of the bankfull height above the present water is recorded. This is the height from baseflow of the stream to where it would flow at its stream channel capacity. The amount of channel incision (downcutting of the stream over geological time) is measured. This is the height from the water's surface to the incipient point of the flood plain. Bankfull channel width is also measured, which is the width from the right bankfull mark to the left bankfull mark.

The third component also includes measurements of the gradient (slope) and compass bearing (sinuosity) of the stream between each transect, back sighted at each transect from B to K. The slope, recorded in percent, is measured with a field crew member reading a clinometer at eye level and standing at or near water's edge. The field crew member then back-sights to the previous transect at an individual standing at the same depth, at a point that is equal height to eye level of the person looking through the clinometer. A field crew member also records the sinuosity of the stream in the middle of each transect and measures (back-sighting), with an Azimuth compass, the bearing to the middle of the stream at the previous transect.

The fourth and final component is a measurement of stream discharge at one chosen location indicative of the natural flow of the sample reach. Discharge is measured with a Flow Mate model 2000 flow meter at 30 equal distances (points) across the stream. Width of the stream is measured in tenths of feet and then divided by 30. This will be the width of the point being measured. The width times the depth of the point being measured gives the area of the location flow is being collected. Area times the velocity recorded by the flow meter equals the discharge in cubic feet per second at this point on the stream. The 30 discharge measurements are added together for the total discharge in CFS (Cubic Feet per Second) of the stream.

FRESHWATER MUSSEL COMMUNITY SAMPLING:

A one person hour mussel search is conducted at each site. This would consist of collecting dead shells from the site or groping for live specimens in the stream. On occasion, if the mussel numbers are very low at a site, a shell may be collected upon first discovery of the specimen while working at the site. This is to keep it from being damaged while other data collecting efforts are being conducted throughout the day. Most shells are identified and recorded at the

site. Each species are also categorized according to live, recent or weathered condition. All live mussels are returned to the water. If there is a questionable identification of any live specimen, several photographs are taken and later examined by biologists at the Operations Office. Any dead specimens that are questionable in identification are put in a labeled zip-lock bag and brought back to the Aquatic Research Resources Facility at the Pratt Operations headquarters and examined more closely by biologists. Mussel data is entered into the Stream Monitoring Program database.

SITE PHOTO:

A photograph is taken of the survey site.

DEFINITIONS

Length of Sample Site:

Average measured stream width X 40; the minimum distance of 492 feet, or the maximum distance of 984 feet.

Stream Channel Depth:

Measurements of the maximum depth of the stream channel at 100-150 equally spaced intervals along the sample reach.

Stream Width:

The maximum, minimum, and average stream widths are based upon the wetted width measurements equal-distant apart along the sample reach.

Stream Flow:

Rate at which a volume of water flows past a point over a unit of time; measured in cubic feet per second - CFS.

Water Chemistry: **

pH - A measurement of the intensity of the basic or acidic condition of the stream. The pH may range from 0 to 14, where 0 is most acidic, 14 most basic, and 7 neutral. Natural waters usually have a pH between 6.5 and 8.5. Optimum levels for fish are 6.5 to 9.0.

Alkalinity - The capacity of water to neutralize acids. Alkalinity is expressed in mg/L of equivalent calcium carbonate. Alkalinity is a measure of how much acid can be added to a liquid without causing a great change in pH. Values between 120-400 mg/L are optimum for fish, but they may tolerate a wider range.

Conductivity - A measurement that indicates the capacity of a sample of water to carry an electrical current. Conductance is measured in micro-Siemens (FS). Kansas streams usually being 300 microSiemens (low conductivity) - 2800 microSiemens (very high conductivity).

Total Dissolved Solids - A measurement of all the dissolved solids in a water sample including minerals, chlorides, phosphates, and nitrates. Calcium carbonate, or limestone, is a common dissolved solid in Kansas streams.

Nitrates - A measurement of the nitrate ion, or more often written as "nitrate-nitrogen." Although nitrate occurs naturally in water, elevated levels in groundwater usually result from human activities such as overuse of chemical fertilizers and improper disposal of human and animal wastes. These fertilizers and wastes are sources of nitrogen-containing compounds which are converted to nitrates in the soil. Nitrates are extremely soluble in water and can move easily through soil into surface and ground water. Acceptable public drinking water supply nitrate levels are <10 mg/L.

Water Chemistry Continued...

Phosphorus -A measurement of phosphorus which is usually present in natural waters as phosphate. Organic phosphate is a part of living plants and animals, their by-products, and their remains. Phosphorus sources include human and animal wastes, industrial wastes, and land and vegetation disturbances. If excessive phosphate enters the waterway, algae and aquatic plants will grow wildly, choke up the waterway, and use up large amounts of dissolved oxygen. This condition is known as eutrophication or over-fertilization of waters. This rapid growth of aquatic vegetation eventually dies and uses up dissolved oxygen as it decays. These lowered dissolved oxygen levels cause aquatic organisms to die off.

Chlorides - Ionic compounds containing the chloride ion. Although a relatively nontoxic ion, chloride can be problematic in high concentrations. The channel catfish has survived in areas with concentrations up to 8,000 mg/L.

Ammonia - A measurement of ammonia, a form of nitrogen, which is extremely soluble in water. It is formed in nature mostly by the decay of human and animal waste. Ionized and unionized ammonia occur. The unionized form is toxic to fish and other aquatic organisms. The percentage of total ammonia in the unionized form increases as pH and water temperature increase. Fish growth and survival may be reduced at levels >0.0125 mg/L, depending on pH and temperature.

Dissolved Oxygen - A measurement indicating the quantity of free-oxygen dissolved in water available for fish and other aquatic organisms. Optimum levels for fish are >5 mg/L. Oxygen present in the water is necessary for respiration in aquatic animals and in cycling of organic matter in a stream. The amount of dissolved oxygen influences the types of species found in streams. Sunlight, temperature, stream morphology, currents, and decaying organic matter can affect dissolved oxygen content.

Turbidity - A measurement used to indicate the clarity of water. Technically, turbidity is an optical property of the water based on the amount of light reflected by suspended particles. Turbidity is measured in Formazin Turbidity Units. An FTU score of 0 is equivalent to the clarity of distilled water.

Water Temperature - Water temperature can affect spawning times, dissolved oxygen, and other water chemistry variables. It also can regulate the occurrence and distribution of vegetation, fish, invertebrates, and other organisms.

Water Chemistry Continued...

Air Temperature - can affect some water chemistry parameters.

*** water chemistry results from this survey are based on a one-time sample per site. Water chemistry can vary by day, season, and year. These results are not meant to characterize an entire stream, watershed, or replace results collected by other long-term water chemistry monitoring programs.*

Fish Population Comparisons:

This is a table showing the fish identified from the survey site. The table also indicates the relative abundance (% by #.) which is what percent that species of fish makes up of the total population of the fish community sampled. Also, the percent difference of relative abundance is shown which indicates, where comparable, the difference between the abundance of a certain species found at this site from previous surveys.

The bottom of the table has an Index of Biotic Integrity (IBI) value. This index uses twelve metrics that combine many different biological factors from a fish community. Expectation criteria are developed for each of these metrics and are assigned a score of zero thru ten. After the data is compiled and summarized, a final score is calculated, thus the IBI score. The higher the IBI score, the greater the stability exhibited by the fish community. These metrics were based on weighted metrics from an IBI designed for different regions of Kansas.

- Total number of native fish species.
- Number of native family richness.
- Total number of individuals collected.
- Number of sensitive species.
- Proportion of tolerant individuals.
- Number of native benthic species
- Number of native water column species.
- Number of long-lived species
- Proportion of individuals of introduced species
- Proportion of individuals as carnivores.
- Proportion of individuals as insectivores and invertevores
- Proportion of individuals as omnivores and herbivores

IBI Value: >= 70 good
40-69.9 fair
<40 poor

Mussel Shells Collected:

This is a list of freshwater mussel shells identified from the survey site.

Live = live specimen

Recent = recently dead; meat still present or inside layer of shell still shiny or iridescent

Weathered = inside layer and outside layer of shell chalky white, outside layer, periostracum, gone or partially intact

Macroinvertebrates (aquatic insects) Collected:

This is a list of aquatic insects collected in the survey site.

The bottom of the table has a Macroinvertebrate Biotic Index (MBI) value. Many inverts have a tolerance value associated with each family of insects. Sensitive or pollution intolerant inverts will have a low tolerance value, tolerant or pollution tolerant inverts will have a higher tolerance value. There are also values for inverts with intermediate levels of tolerance. This tolerance value is multiplied by the number of inverts with its tolerance value. All the multiplied tolerance values are added together then divided by the number of invertebrates collected.

$$MBI = (n * t)/N$$

MBI values: <= 4.5: no impact from nutrient and oxygen demanding pollutants.
4.51 – 5.39: moderate impact
>= 5.4: high impact

Species richness is lower as you go west across the state. Changes in habitat availability and permanence of water affect species distribution. IBI and MBI scores are generally lower for the western streams because of the extreme conditions of the high plains.

Physical Habitat measurements collected:

Stream Substrate - refers to particles on the stream bed, both organic (wood) and inorganic (sand). This is displayed as the percent of which substrate makes up the sample site.

Particle size:

- bedrock - rocks bigger than a car
- boulders - basketball to car size
- cobble - tennis ball to basketball
- course gravel - marble to tennis ball
- fine gravel - ladybug to marble
- sand - smaller than ladybug, gritty between fingers
- silt - clay, muck, not gritty between fingers
- other - claypan, bridge foundation, metal, tires, etc.

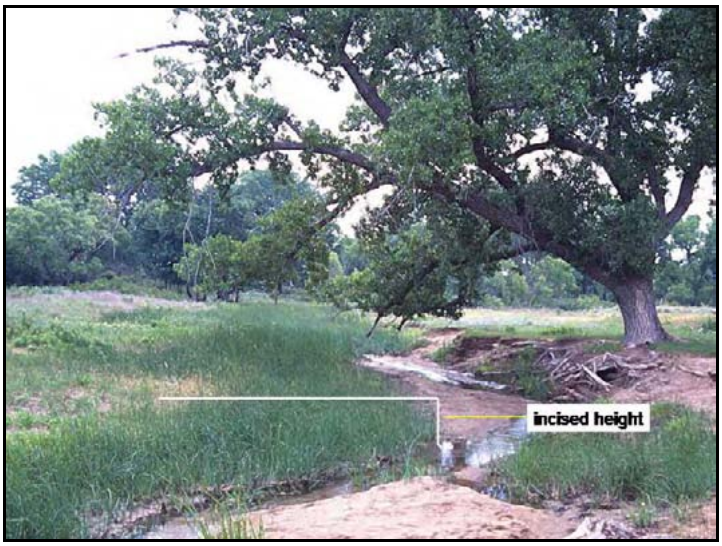
Bank Angle - the angle of the bank from 3.5 feet up the bank down to the waters edge measured equal-distance along the sample site. Looking downstream, the left bank is on the left side and the right bank is on the right side. Measurements

Physical Habitat Measurements collected Continued...

were made in degrees. Any number greater than 90 (ex. 135) is an undercut bank.

Canopy (Overhead) Stream Cover - The percent of stream cover whether it is natural (trees) or artificial (bridge) that covers the stream and its banks along the sample site.

Bank (Incised) Height - down cutting of the stream over geological time, also known as the distance between the water and the incipient point where the stream breaks over into its floodplain.



Stream Channel Type - distinguished channel habitat units (types) given to the stream.

pool - still water, low velocity, smooth glassy surface, usually deep compared to other parts of the channel. Channel types are expressed in percent makeup of sample site.

glide - water moving slowly with smooth unbroken surface.

riffle - water moving with small ripples, waves and eddies. Waves not breaking, surface tension not broken. sound: babbling, gurgling

rapid - water movement rapid and turbulent, surface with intermittent white water with breaking waves. sound: continuous rushing

cascade - water movement rapid and very turbulent over steep channel bottom. Most of water surface broken in short irregular plunges, mostly white water. sound: roaring

falls - free falling water over vertical or near vertical drop into plunge, water white over high falls. sound: splash to roar

dry channel - no water in stream channel

131-RFM-07

Plum Creek

Cheyenne Co.

NW4 of NW/4 SEC. 26, 2S, 40W

5/30/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	607 feet		
Average Stream Depth	1.9 feet shallowest - 3.1 inches deepest - 3.9 feet		
Stream Width	21.1' Maximum	10.4' Minimum	14.3' Average
Stream Flow	0.378 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.7
Alkalinity	164 mg/l
Conductivity	502 microSiemens
Total Dissolved Solids	243 mg/l
Nitrates	1.7 mg/l
Phosphorus	0.02 mg/l
Chlorides	13 mg/l
Ammonia	0.19 mg/l
Dissolved Oxygen	3.8 mg/l
Turbidity	46 FTU
Salinity	0.2 %
Water Temperature	57 F
Air Temperature	63 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	66	15.7
central stoneroller	4	1.0
creek chub	8	1.9
fathead minnow	63	15.0
green sunfish	280	66.5
Total	**421**	**100**

Index of Biotic Integrity = 59

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	30
Basomamatophora	Physidae	pouch snail	24
Basomamatophora	Planorbidae	orb snail	4
Branchiura	Argulidae	common fish louse	1
Coleoptera	Dytiscidae	predaceous diving beetle	12
Coleoptera	Haliplidae	crawling water beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	30
Decapoda	Cambaridae	crayfish	2
Diptera	Ceratopogonidae	biting midge	5
Diptera	Chironomidae	midge	21
Diptera	Stratiomyidae	aquatic soldier fly	9
Diptera	Tabanidae	deer/horse fly	3
Ephemeroptera	Caenidae	small squaregills mayfly	29
Heteroptera	Belostomatidae	giant water bug	10
Heteroptera	Corixidae	water boatman	5
Heteroptera	Notonectidae	backswimmer	1
Heteroptera	Veliidae	shortlegged strider	1
Mesogastropoda	Pleuroceridae	river snail	5
Odonata	Coenagrionidae	narrowwinged damselfly	185
Odonata	Gomphidae	club-tailed dragonfly	1
Odonata	Libellulidae	common skimmer dragonfly	14
Rhynchobdellida	Glossiphoniidae	leech	4
Tricladida	Planariidae	flatworm	8
Trombidiformes	Unionicolidae	water mite	3
Veneroida	Pisidiidae	peaclam	15

Macroinvertebrate Biotic Index = 6.020

BIOLOGIST NOTE:

This is a nice high plains spring fed prairie stream that is virtually untouched with only a bridge crossing. Stable banks with overhanging vegetation were present throughout the site. The IBI value of 59 is not a good score. This is mainly due to the fish community consists of tolerant fish species. Most high plains fish communities exist of tolerant fish species to withstand the environmental fluctuations that occur here. The MBI value of 6.020 is considered highly impacted but the MBI scale may not be weighted for extreme western Kansas where the habitats for more sensitive macroinvertebrates don't exist. Like the fish community, the macroinvertebrate community is made up of tolerant insects that can withstand the conditions in this part of the state. The water chemistry conditions are adequate.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Fine/silt -100%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	70	25	42
	Maximum	Minimum	Average
Right Bank -	81	10	41
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

0%	0%	0%
Maximum	Minimum	Average

Left side of stream - 0%
Right side of stream - 0%
Center of stream - 0%

BANK (INCISED) HEIGHT:

3.9	2.0	3.0
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 62%
Pool - 38%

132-RFM-07

South Fork Republican River

Cheyenne Co.

NW/4 of NW/4 SEC. 26, 2S, 40W

5/31/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	755 feet		
Average Stream Depth	3.1 feet shallowest -3.1 inches deepest - 3.9 feet		
Stream Width	92.0' Maximum	21.5' Minimum	53.4' Average
Stream Flow	8.430 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.7
Alkalinity	289 mg/l
Conductivity	784 microSiemens
Total Dissolved Solids	383 mg/l
Nitrates	2.1 mg/l
Phosphorus	0.01 mg/l
Chlorides	57 mg/l
Ammonia	0.01 mg/l
Dissolved Oxygen	4.5 mg/l
Turbidity	9 FTU
Salinity	0.4 %
Water Temperature	61 F
Air Temperature	55 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
brassy minnow	2	1.8
central stoneroller	70	61.9
creek chub	2	1.8
fathead minnow	1	0.9
green sunfish	1	0.9
orangethroat darter	7	6.2
white sucker	30	26.5
Total	**113**	**100**

Index of Biotic Integrity = 60

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	45
Basomamatophora	Physidae	pouch snail	6
Coleoptera	Dytiscidae	predaceous diving beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	1
Decapoda	Cambaridae	crayfish	2
Diptera	Chironomidae	midge	6
Diptera	Simuliidae	black fly	4
Ephemeroptera	Caenidae	small squaregills mayfly	7
Ephemeroptera	Tricorythidae	little stout crawlers	2
Heteroptera	Corixidae	water boatman	1
Odonata	Calopterygidae	broadwinged damselfly	1
Odonata	Lestidae	spreadwinged damselfly	3
Odonata	Libellulidae	common skimmer dragonfly	5
Plecoptera	Perlidae	common stonefly	4
Rhynchobdellida	Glossiphoniidae	leech	5
Veneroida	Pisidiidae	peaclam	1

Macroinvertebrate Biotic Index = 5.174

BIOLOGIST NOTE:
This site had slightly higher flow due to seasonal rains and water being released from Bonney Reservoir in Colorado which made fish and macroinvertebrate collecting little more difficult. Water chemistry is decent, especially being adjacent to a golf course on the left bank. An IBI value of 60 is considered fair. The cattails were flooded which could have provided refuge for many fish while surveying. The brassy minnow, a species in need of conservation in Kansas, was considered a good find to collect two individuals. Many of the white suckers collected were juveniles which indicates good reproduction of this species. The higher flows may have helped this occur. The MBI value of 5.174 is actually good for this part of the state. This river has better habitat for macroinvertebrates than most streams in this part of the state. The flooded vegetation is also a plus for macroinvertebrate habitat. The collection of stoneflies in this part of the state is an exceptional discovery since they are considered a very sensitive macroinvertebrate. This river can be considered an oasis in this part of the state.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -18% Fine/silt -82%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	55	1	25
	Maximum	Minimum	Average
Right Bank -	38	15	27
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

91%	50%	70%
Maximum	Minimum	Average

Left side of stream - 69%
Right side of stream - 65%
Center of stream - 75%

BANK (INCISED) HEIGHT:

0.3	0.3	0.3
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 8%
Pool - 92%

133-RFM-07

Hell's Canyon Spring

Cheyenne Co.

SW4 of SE/4 SEC. 32, 1S, 39W

6/1/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	1.4 feet shallowest - 1 inch deepest - 2.8 feet		
Stream Width	24.1' Maximum	3.3' Minimum	10.9' Average
Stream Flow	0.367 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.5
Alkalinity	264 mg/l
Conductivity	3030 microSiemens
Total Dissolved Solids	1552 mg/l
Nitrates	1.5 mg/l
Phosphorus	0.05 mg/l
Chlorides	200 mg/l
Ammonia	0.03 mg/l
Dissolved Oxygen	1 mg/l
Turbidity	26 FTU
Salinity	1.6 %
Water Temperature	61 F
Air Temperature	59 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
No fish collected		
Total		

Index of Biotic Integrity = 0

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	16
Basomamatophora	Ancylidae	limpet snail	2
Basomamatophora	Physidae	pouch snail	29
Basomamatophora	Planorbidae	orb snail	2
Coleoptera	Chrysomelidae	leaf beetle	1
Coleoptera	Dytiscidae	predaceous diving beetle	38
Coleoptera	Haliplidae	crawling water beetle	9
Coleoptera	Hydrophilidae	water scavenger beetle	5
Collembola	Poduridae	podurid springtail	3
Diptera	Chironomidae	midge	9
Ephemeroptera	Baetidae	small minnow mayfly	26
Heteroptera	Corixidae	water boatman	5
Heteroptera	Notonectidae	backswimmer	22
Mesogastropoda	Pleuroceridae	river snail	4
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Lestidae	spreadwinged damselfly	6
Orthoptera	Gryllidae	cricket	2

Macroinvertebrate Biotic Index = 6.405

BIOLOGIST NOTE:
As expected no fish were collected, mostly tadpoles and macroinvertebrates were collected. MBI value of 6.405 is considered impacted but the main impact in this part of the state is the lack of precipitation/ground water to sustain flows. Although, there was flow recorded due to a spring flowing this time of year. The spring had high amount of minerals due to the high conductivity and total dissolved solids values. The salinity was also somewhat high for most streams in Kansas. Overall, it was a great opportunity to survey an undisturbed secluded area and get some current data, too bad we weren't able to survey this site 100-plus years earlier.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Fine/silt -100%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	70	5	29
	Maximum	Minimum	Average
Right Bank -	122	7	40
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

0%	0%	0%
Maximum	Minimum	Average

Left side of stream - 0%
Right side of stream - 0%
Center of stream - 0%

BANK (INCISED) HEIGHT:

2.0	1.3	1.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 25%
Riffle - 17%
Pool - 57%

134-RFM-07

Wild Horse Creek

Ness Co.

NW/4 of NE/4 SEC. 9, 18S, 24W

6/4/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	9 inches shallowest - 2 inches deepest - 1.6 feet		
Stream Width	18.9' Maximum	2.6' Minimum	10.5' Average
Stream Flow	0.612 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.7
Alkalinity	216 mg/l
Conductivity	1552 microSiemens
Total Dissolved Solids	772 mg/l
Nitrates	0.9 mg/l
Phosphorus	0.06 mg/l
Chlorides	208 mg/l
Ammonia	0.03 mg/l
Dissolved Oxygen	3.9 mg/l
Turbidity	6 FTU
Salinity	0.8 %
Water Temperature	61 F
Air Temperature	59 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	1	3.3
common carp	1	3.3
green sunfish	14	46.7
largemouth bass	13	43.3
white crappie	1	3.3
Total	**30**	**100**

Index of Biotic Integrity = 54

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
giant floater	No	Yes	No
pondhorn	No	Yes	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	423
Basomamatophora	Physidae	pouch snail	7
Basomamatophora	Planorbidae	orb snail	2
Branchiura	Argulidae	common fish louse	1
Coleoptera	Dytiscidae	predaceous diving beetle	63
Coleoptera	Hydrophilidae	water scavenger beetle	14
Collembola	Sminthuridae	sminthurid springtail	1
Decapoda	Cambaridae	crayfish	5
Diptera	Ceratopogonidae	biting midge	3
Diptera	Chironomidae	midge	10
Ephemeroptera	Baetidae	small minnow mayfly	19
Ephemeroptera	Caenidae	small squaregills mayfly	7
Heteroptera	Belostomatidae	giant water bug	2
Heteroptera	Corixidae	water boatman	2
Odonata	Coenagrionidae	narrowwinged damselfly	22
Odonata	Corduliidae	green eyed skimmer dragonfly	1
Odonata	Libellulidae	common skimmer dragonfly	12
Pharyngobdellida	Erpobdellidae	leech	1
Rhynchobdellida	Glossiphoniidae	leech	2
Tricladida	Planariidae	flatworm	70
Trombidiformes	Arrenuridae	water mite	3

Macroinvertebrate Biotic Index = 4.327

BIOLOGIST NOTE:
We surveyed downstream of this site in 2003 and the site consisted of a big long pool and a lot of woody debris. This site had a variety of habitat with pools, runs and riffles and good bank vegetation. However, the fish community is only considered fair. The main reasons for this is the fish community is made up of all tolerant fish species, no “minnows” present, and 90% of the community is made up of predator fish species. The largemouth bass and white crappie are introduced to this area of the state and the common carp is introduced to the United States. Nevertheless, the macroinvertebrate community is excellent with a MBI value of 4.327. This value is considered exceptional for this area of the state on the high plains. Maybe with the fish community being dominated with fish eating predators and no minnows, and good available habitat, the macroinvertebrate community was able to thrive under these conditions. The presence of two recent mussels species is also a good discovery. The water chemistry values are adequate and is what to be expected in this part of the state.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Fine/silt -100%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	115	5	40
	Maximum	Minimum	Average
Right Bank -	110	4	38
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

58%	6%	21%
Maximum	Minimum	Average

Left side of stream - 41%
Right side of stream - 11%
Center of stream - 11%

BANK (INCISED) HEIGHT:

3.3	1.6	2.2
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 55%
Riffle - 29%
Pool - 17%

135-RFM-07

Brenner Springs

Ness Co.

NW/4 of NW/4 SEC. 18, 19S, 26W

6/5/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	6 inches shallowest - 2 inches deepest - 1.0 feet		
Stream Width	4.6' Maximum	1.0' Minimum	2.0' Average
Stream Flow	0.013 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.9
Alkalinity	237 mg/l
Conductivity	1116 microSiemens
Total Dissolved Solids	549 mg/l
Nitrates	2.6 mg/l
Phosphorus	0.05 mg/l
Chlorides	126 mg/l
Ammonia	0.05 mg/l
Dissolved Oxygen	5.9 mg/l
Turbidity	8 FTU
Salinity	0.5 %
Water Temperature	61 F
Air Temperature	66 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
No fish collected		
Total		

Index of Biotic Integrity = 0

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	28
Basomamatophora	Physidae	pouch snail	9
Branchiura	Argulidae	common fish louse	12
Coleoptera	Dytiscidae	predaceous diving beetle	2
Coleoptera	Haliplidae	crawling water beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	5
Conchostraca		clam shrimp	1
Diptera	Chironomidae	midge	76
Diptera	Dixidae	dixid midge	2
Diptera	Ephydridae	shore fly	1
Diptera	Ptychopteridae	phantom crane fly	24
Diptera	Sciomyzidae	marsh fly	1
Diptera	Simuliidae	black fly	19
Diptera	Stratiomyidae	aquatic soldier fly	31
Diptera	Tipulidae	crane fly	4
Heteroptera	Belostomatidae	giant water bug	3
Heteroptera	Hebridae	velvet shorebug	1
Mesogastropoda	Pleuroceridae	river snail	1
Odonata	Coenagrionidae	narrowwinged damselfly	51
Odonata	Corduliidae	green eyed skimmer dragonfly	5
Trichoptera	Limnephilidae	northern casemaker caddisfly	2
Tricladida	Planariidae	flatworm	38
Trombidiformes	Arrenuridae	water mite	14
Veneroida	Pisidiidae	peaclam	6

Macroinvertebrate Biotic Index = 7.540

BIOLOGIST NOTE:
As expected no fish were collected at this site. The spring had good flow with numerous aquatic plants present instream and on the banks. The MBI value of 7.540 is a relatively poor value for a macroinvertebrate community. I thought it would have a better value than this with all the aquatic vegetation present, the lack of predators (fish) and the fact the spring has good constant flow just starting a few hundred yards upstream of the site. Many of the insects collected are considered tolerant species which cause the value to be poor. Although it must be considered that conditions on the high plains call for tolerant species in order to survive. The water chemistry values shown high minerals in the conductivity, total dissolved solids and chloride readings. This may be due to “hard water” conditions in the ground water in this area. The nitrate levels seem somewhat elevated for being this close to the “head” of the spring. This could also be a condition of the ground water for the area. Although we didn’t collect any fish it was still a success to survey a remote constant spring in this area of the state.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Fine/silt -100%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	105	4	39
	Maximum	Minimum	Average
Right Bank -	50	1	17
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

53%	0%	20%
Maximum	Minimum	Average

Left side of stream - 12%
Right side of stream - 33%
Center of stream - 16%

BANK (INCISED) HEIGHT:

1.3	0.7	1.1
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 100%

136-RFM-07

Dry Bazine Creek

Ness Co.

NW/4 of SW/4 SEC. 32, 16S, 23W

6/6/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	9 inches shallowest - 3 inches deepest - 1.8 feet		
Stream Width	21.5' Maximum	4.9' Minimum	10.2' Average
Stream Flow	0.104 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.5
Alkalinity	248 mg/l
Conductivity	1428 microSiemens
Total Dissolved Solids	708 mg/l
Nitrates	1.7 mg/l
Phosphorus	0.2 mg/l
Chlorides	209 mg/l
Ammonia	0.09 mg/l
Dissolved Oxygen	1.7 mg/l
Turbidity	19 FTU
Salinity	0.7 %
Water Temperature	66 F
Air Temperature	70 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
largemouth bass	1	100.0
Total	**1**	**100**

Index of Biotic Integrity = 32

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	441
Basomamatophora	Physidae	pouch snail	12
Basomamatophora	Planorbidae	orb snail	2
Cladocera		water flea	4
Coleoptera	Dytiscidae	predaceous diving beetle	7
Coleoptera	Hydrophilidae	water scavenger beetle	5
Copepoda		copepod	3
Decapoda	Cambaridae	crayfish	2
Diptera	Chironomidae	midge	59
Diptera	Sciomyzidae	marsh fly	1
Ephemeroptera	Baetidae	small minnow mayfly	36
Heteroptera	Corixidae	water boatman	7
Heteroptera	Notonectidae	backswimmer	3
Odonata	Aeshnidae	darner dragonfly	1
Rhynchobdellida	Glossiphoniidae	leech	1
Tricladida	Planariidae	flatworm	6
Veneroida	Pisidiidae	peaclam	2

Macroinvertebrate Biotic Index = 4.876

BIOLOGIST NOTE:

The site consisted of pools and long runs with tumbleweeds and areas of instream vegetation. There was flow present from an spring upstream of the site. The water chemistry values are what to be expected for this area of the state. The IBI value of 32 is somewhat misleading due to the fact only one fish was collected and it was a fish that was introduced to this area of the state. A good stream would have a balance of native minnows, catfishes, and sunfish. Much of this stream dries up annually so the conditions are not favorable for a fish community. There is not a big diversity of macroinvertebrates but the MBI value of 4.8 is considered exceptional for this area of the state under these environment conditions. The presence of good vegetation and the lack of “minnows” at this site might support with the good MBI value. It was good to survey this stream being most of this region is very dry and the lack of intermittent streams.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Fine/silt -100%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	110	6	28
	Maximum	Minimum	Average
Right Bank -	105	9	26
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

77%	0%	27%
Maximum	Minimum	Average

Left side of stream - 31%
Right side of stream - 22%
Center of stream - 29%

BANK (INCISED) HEIGHT:

1.6	1.3	1.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 83%
Pool - 17%

137-RFM-07

North Fork Walnut Creek

Ness Co.

SW/4 of SE/4 SEC. 5, 19S, 23W

6/7/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	8 inches shallowest - 4 inches deepest - 2.2 feet		
Stream Width	16.9' Maximum	5.9' Minimum	10.7' Average
Stream Flow	0.293 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.8
Alkalinity	190 mg/l
Conductivity	1516 microSiemens
Total Dissolved Solids	753 mg/l
Nitrates	0.1 mg/l
Phosphorus	0.55 mg/l
Chlorides	205 mg/l
Ammonia	0 mg/l
Dissolved Oxygen	4 mg/l
Turbidity	36 FTU
Salinity	0.8 %
Water Temperature	64 F
Air Temperature	59 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	38	8.8
common carp	163	37.8
fathead minnow	104	24.1
green sunfish	6	1.4
largemouth bass	3	0.7
orangespotted sunfish	23	5.3
red shiner	15	3.5
western mosquitofish	78	18.1
yellow bullhead	1	0.2
Total	**431**	**100**

Index of Biotic Integrity = 55

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
giant floater	No	Yes	No
pondhorn	Yes	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	1
Basomamatophora	Physidae	pouch snail	10
Coleoptera	Dytiscidae	predaceous diving beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	6
Decapoda	Cambaridae	crayfish	5
Diptera	Ceratopogonidae	biting midge	3
Diptera	Chironomidae	midge	90
Diptera	Simuliidae	black fly	17
Ephemeroptera	Caenidae	small squaregills mayfly	8
Heteroptera	Corixidae	water boatman	47
Heteroptera	Gerridae	water strider	1
Neotaenioglossa	Bithyniidae	bithyniid snail	2
Odonata	Coenagrionidae	narrowwinged damselfly	1
Rhynchobdellida	Glossiphoniidae	leech	10
Trichoptera	Hydropsychidae	common netspinner caddisfly	15
Veneroida	Pisidiidae	peaclam	6

Macroinvertebrate Biotic Index = 8.855

BIOLOGIST NOTE:
The site looked like a dam or a structure had been removed downstream indicating a sudden drop in water level, although, there was a new bridge being built downstream; little over a quarter of a mile. The areas of the bank were bare silt with no vegetation trying to emerge. There seemed to be no indication of recent flooding. The water chemistry values are normal for this part of the state. The IBI value for the fish community is considered fair. The main driving factors for this lower value is the fish community is made up of tolerant species that can withstand harsh environment conditions and the presence of 163 common carp which is an introduced fish to the United States. The MBI value of 8.855 is considered poor. This could be due to some environmental impacts or the sudden drop in water level leaving no bank vegetation for habitat. Additionally, there are many tolerant aquatic insect species present which is common for this area of the state.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -16% Fine/silt -78%
Fine Gravel -5%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	115	5	30
	Maximum	Minimum	Average
Right Bank -	65	5	23
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

81 %	1%	22%
Maximum	Minimum	Average

Left side of stream - 24%
Right side of stream - 18%
Center of stream - 24%

BANK (INCISED) HEIGHT:

2.3	1.3	1.8
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 73%
Riffle - 17%
Pool - 10%

138-RFM-07
120-RFM-06
077-RFM-05
041-RFM-04

Clear Fork Creek

Pottawatomie Co.

NW/4 of NW/4 SEC. 20, 6S, 10E

7/31/06

6/11/07

2007 STREAM COMPARISONS

	2004	2005	2006	2007
Length of Sample Site	492 feet	515 feet	515 feet	492 feet
Average Stream Depth	7 inches shallowest - 1 inch deepest - 4.6 feet	1.2 feet shallowest - 1 inch deepest - 5.0 feet	9 inches shallowest - 0 inches deepest - 3.9 feet	1.2 feet shallowest - 2 inches deepest - 6.1 feet
Stream Width	15.0' Maximum 6.8' Minimum 10.7' Average	17.7' Maximum 5.9' Minimum 10.8' Average	20.8' Maximum 0.0' Minimum 6.3' Average	27.3' Maximum 0.0' Minimum 14.1' Average
Stream Flow	0.000 CFS	0.000 CFS	0.000 CFS	0.141 CFS

2007 WATER CHEMISTRY

	2004	2005	2006	2007
pH	7.7	7.8	7.6	8.0
Alkalinity	264 mg/l	233 mg/l	231 mg/l	275 mg/l
Conductivity	715 microSiemens	642 microSiemens	639 microSiemens	721 microSiemens
Total Dissolved Solids	349 mg/l	236 mg/l	311 mg/l	351 mg/l
Nitrates	0.7 mg/l	1.1 mg/l	6.1 mg/l	2.3 mg/l
Phosphorus	0.02 mg/l	0.01 mg/l	0.07 mg/l	0.02 mg/l
Chlorides	1 mg/l	22 mg/l	73 mg/l	31 mg/l
Ammonia	0.02 mg/l	0.07 mg/l	0.21 mg/l	0.06 mg/l
Dissolved Oxygen	3.4 mg/l	4.2 mg/l	0.8 mg/l	5.8 mg/l
Turbidity	17 FTU	8 FTU	137 FTU	17 FTU
Salinity	not available	not available	not available	0.3%
Water Temperature	68 F	75 F	75 F	68 F
Air Temperature	71 F	79 F	86 F	75 F

FISH POPULATION COMPARISONS

SPECIES	2004		2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #	#	% BY #
black bullhead	3	0.4	2	0.5	15	1.3	18	5.4
bluntnose minnow	33	4.2	27	7.3	123	10.6	4	1.2
central stoneroller	294	37.4	73	19.8	184	15.8	10	3.0
common shiner	22	2.8	11	3.0	69	5.9	11	3.3
creek chub	90	11.5	25	6.8	279	23.9	11	3.3
fathead minnow	161	20.5	34	9.2	206	17.7	64	19.2
green sunfish	61	7.8	74	20.1	161	13.8	132	39.6
johnny darter	18	2.3	3	0.8	1	0.1	0	0.0
orangethroat darter	36	4.6	72	19.6	8	0.7	30	9.0
red shiner	48	6.1	26	7.1	82	7.0	35	10.5
southern redbelly dace	0	0.0	0	0.0	1	0.1	0	0.0
white sucker	12	1.5	5	1.4	21	1.8	7	2.1
yellow bullhead	8	1.0	16	4.3	15	1.3	11	3.3
Total	**786**	**100**	**368**	**100**	**165**	**100**	**333**	**100**
Index of Biotic Integrity = 86			86		97		73	

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
pondhorn	No	Yes	No
pondmussel	No	Yes	No

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	28
Basomamatophora	Physidae	pouch snail	26
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Dytiscidae	predaceous diving beetle	3
Coleoptera	Elmidae	riffle beetle	4
Coleoptera	Gyrinidae	whirligig beetle	1
Coleoptera	Haliplidae	crawling water beetle	2
Coleoptera	Hydrophilidae	water scavenger beetle	2
Copepoda		copepod	1
Decapoda	Cambaridae	crayfish	2
Diptera	Ceratopogonidae	biting midge	2
Diptera	Chironomidae	midge	94
Diptera	Culicidae	mosquito	4
Diptera	Empididae	aquatic dance fly	1
Diptera	Simuliidae	black fly	62
Ephemeroptera	Baetidae	small minnow mayfly	2
Ephemeroptera	Caenidae	small squaregills mayfly	1
Heteroptera	Nepidae	water scorpion	1
Heteroptera	Veliidae	shortlegged strider	1
Odonata	Coenagrionidae	narrowwinged damselfly	1
Odonata	Gomphidae	club-tailed dragonfly	1
Odonata	Libellulidae	common skimmer dragonfly	1
Pharyngobdellida	Erpobdellidae	leech	4
Plecoptera	Perlidae	common stonefly	2
Pulmonata		unidentified snail	1
Rhynchobdellida	Glossiphoniidae	leech	3
Trichoptera	Hydropsychidae	common netspinner caddisfly	18
Veneroida	Pisidiidae	peaclam	3

Macroinvertebrate Biotic Index: 2004 = 6.242
2005 = 6.372
2006 = 8.701
2007 = 7.851

BIOLOGIST NOTE:
This site is about the opposite of last year's site, going from a drought to two five inch rains previous to this survey. The IBI is still good but the value has dropped from previous years. Either the fish were more concentrated in pools in 2006 from the drought or the fish were more dispersed in 2007 due to all the water available and recent high flow events. The aquatic insect community is staying consistent in the MBI value which is poor for this area. Good diversity of insects, just high numbers of certain tolerant species in the community. Usually the aquatic insect community is easily affected from high flow events but this site must have recovered quickly. Nitrate levels may be elevated a little for this much flow present and water volume. There is one more survey scheduled for the summer of 2008 as part of the five year survey plan.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -7% Fine/silt -15%
Fine Gravel -13% Course Gravel - 38%
Cobble - 20% Boulder - 4%
Bedrock - 4%

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	135	8	46
	Maximum	Minimum	Average
Right Bank -	100	7	32
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	41%	82%
Maximum	Minimum	Average

Left side of stream - 80%
Right side of stream - 82%
Center of stream - 84%

BANK (INCISED) HEIGHT:

6.2	2.6	3.8
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 33%
Riffle - 21%
Pool - 46%

139-RFM-07
121-RFM-06

Clear Fork Creek

Pottawatomie Co.

SW/4 of SW/4 SEC. 17, 6S, 10E

6/12/07

8/1/06

2007 STREAM COMPARISONS

	2006	2007
Length of Sample Site	515 feet	492 feet
Average Stream Depth	9 inches shallowest - 0 inches deepest - 3.9 feet	1.1 foot shallowest - 2 inches deepest - 2.8 feet
Stream Width	20.8' Maximum 0.0' Minimum 6.3' Average	26' Maximum 3.9' Minimum 14.6' Average
Stream Flow	0.024 CFS	0.208 CFS

2007 WATER CHEMISTRY

	2006	2007
pH	8.1	8.2
Alkalinity	233 mg/l	284 mg/l
Conductivity	551 microSiemens	710 microSiemens
Total Dissolved Solids	267 mg/l	346 mg/l
Nitrates	6.6 mg/l	1.8 mg/l
Phosphorus	0.01 mg/l	0.02 mg/l
Chlorides	33 mg/l	20 mg/l
Ammonia	0.13 mg/l	0.04 mg/l
Dissolved Oxygen	4 mg/l	6.3 mg/l
Turbidity	116 FTU	8 FTU
Salinity	not available	0.3 %
Water Temperature	81 F	68 F
Air Temperature	91 F	73 F

FISH POPULATION COMPARISONS

SPECIES	2006		2007	
	#	% BY #	#	% BY #
black bullhead	6	0.4	5	0.9
bluntnose minnow	289	17.0	26	4.8
central stoneroller	229	13.4	137	25.5
common shiner	103	6.0	57	10.6
creek chub	189	11.1	23	4.3
fathead minnow	525	30.8	92	17.1
green sunfish	66	3.9	83	15.5
johnny darter	28	1.6	7	1.3
orangespotted sunfish	25	1.5	0	0.0
orangethroat darter	49	2.9	54	10.1
red shiner	140	8.2	46	8.6
white sucker	42	2.5	0	0.0
yellow bullhead	12	0.7	7	1.3
Total	**1703**	**100**	**537**	**100**

Index of Biotic Integrity = 88 75

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
lilliput	Yes	Yes	No
pondhorn	Yes	No	No
pondmussel	No	Yes	No

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	6
Basomamatophora	Physidae	pouch snail	3
Coleoptera	Dytiscidae	predaceous diving beetle	6
Coleoptera	Haliplidae	crawling water beetle	5
Coleoptera	Hydrophilidae	water scavenger beetle	3
Diptera	Chironomidae	midge	213
Diptera	Ephydridae	shore fly	1
Diptera	Simuliidae	black fly	145
Ephemeroptera	Baetidae	small minnow mayfly	9
Ephemeroptera	Caenidae	small squaregills mayfly	1
Pharyngobdellida	Erpobdellidae	leech	1
Plecoptera	Perlidae	common stonefly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	4
Tricladida	Planariidae	flatworm	1

Macroinvertebrate Biotic Index: 2006 = 7.570
2007 = 8.693

BIOLOGIST NOTE:
With two five inch rains earlier this spring (2007) the stream seemed to try to correct itself from being rerouted in spring of 2006. The floods did a lot of scouring of the stream banks and bottom and moved a lot of sediment, some as big as softball size, downstream. (See pictures above) This seemed to have taken away any existing habitat from the 2006 survey the fish and inverts were still adapting to the new channel changes. Many of the mid-level fish species seem to have been affected by the 2007 floods. Either they have dispersed from the high water or they were just more concentrated in 2006 from the lower water conditions. The IBI value is still considered good. The MBI value is poor due to the high number of tolerant aquatic insects species like the midge and black fly. Nice mussel diversity for this high in the watershed. Should be interesting to see how this stretch of stream adjusts from 2007 to 2008 if we have a seasonal spring. There is one more survey scheduled for the summer of 2008 as part of the five year survey plan.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -2%	Fine/silt -31%
Fine Gravel -18%	Course Gravel - 29%
Cobble - 4%	Boulder - 4%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	90	8	26
	Maximum	Minimum	Average
Right Bank -	60	10	30
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

67%	0%	23%
Maximum	Minimum	Average

Left side of stream - 22%
Right side of stream - 34%
Center of stream - 13%

BANK (INCISED) HEIGHT:

8.8	4.2	6.7
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 50%
Riffle - 14%
Pool - 36%

140-RFM-07
122-RFM-06
075-RFM-05
039-RFM-04

Clear Fork Creek

Pottawatomie Co.

SE/4 of SE/4 SEC. 18, 6S, 10E

6/12/07

8/1/06

8/1/05

2007 STREAM COMPARISONS

	2004	2005	2006	2007
Length of Sample Site	556 feet	525 feet	525 feet	581 feet
Average Stream Depth	11 inches shallowest - 1 inches deepest - 2.2 feet	11 inches shallowest - 0 inches deepest - 2.8 feet	5 inches shallowest - 0 inches deepest - 1.8 feet	11 inches shallowest - 3 inches deepest - 2.9 feet
Stream Width	20.0' Maximum 2.6' Minimum 12.1' Average	20.0' Maximum 2.6' Minimum 2.1' Average	14.0' Maximum 0.0' Minimum 4.6' Average	22.8' Maximum 5.2' Minimum 13.2' Average
Stream Flow	0.000 CFS	0.000 CFS	0.000 CFS	0.191 CFS

2007 WATER CHEMISTRY

	2004	2005	2006	2007
pH	7.9	7.9	7.8	7.9
Alkalinity	287 mg/l	259 mg/l	310 mg/l	280 mg/l
Conductivity	690 microSiemens	629 microSiemens	775 microSiemens	688 microSiemens
Total Dissolved Solids	336 mg/l	316 mg/l	378 mg/l	335 mg/l
Nitrates	0.4 mg/l	1.0 mg/l	2.5 mg/l	0.9 mg/l
Phosphorus	0.04 mg/l	0.03 mg/l	0.06 mg/l	0.03 mg/l
Chlorides	3 mg/l	18 mg/l	34 mg/l	20 mg/l
Ammonia	0.05 mg/l	0.06 mg/l	0.55 mg/l	0.05 mg/l
Dissolved Oxygen	3.3 mg/l	4.4 mg/l	1.6 mg/l	6.8 mg/l
Turbidity	44 FTU	10 FTU	195 FTU	24 FTU
Salinity	not available	not available	not available	0.3
Water Temperature	75 F	73 F	86 F	72 F
Air Temperature	86 F	81 F	102 F	88 F

FISH POPULATION COMPARISONS

SPECIES	2004		2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #	#	% BY #
black bullhead	3	0.5	2	0.3	24	2.4	5	1.6
bluntnose minnow	34	5.9	52	8.0	214	21.8	23	7.4
carmine shiner	0	0.0	38	5.8	0	0.0	0	0.0
central stoneroller	108	18.8	159	24.4	56	5.7	32	10.4
common shiner	29	5.1	14	2.1	88	9.0	0	0.0
creek chub	56	9.8	74	11.4	101	10.3	29	9.4
fathead minnow	200	34.9	63	9.7	248	25.3	109	35.3
green sunfish	47	8.2	46	7.1	92	9.4	61	19.7
johnny darter	24	4.2	5	0.8	14	1.4	0	0.0
orangethroat darter	12	2.1	138	21.2	47	4.8	26	8.4
red shiner	36	6.3	43	6.6	39	4.0	21	6.8
white sucker	21	3.7	5	0.8	25	2.5	0	0.0
yellow bullhead	3	0.5	13	2.0	33	3.4	3	1.0
Total	**573**	**100**	**652**	**100**	**981**	**100**	**309**	**100**
Index of Biotic Integrity = 78			93		89		66	

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
lilliput	No	Yes	No
pondhorn	Yes	Yes	No

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
		aquatic earthworm	1
		leech	3
		roundworm	1
		unidentified snail	2
Amphipoda	Gammaridae	scud	4
Basomamatophora	Physidae	pouch snail	11
Basomamatophora	Planorbidae	orb snail	1
Coleoptera		unidentified beetle	1
Coleoptera	Dytiscidae	predaceous diving beetle	8
Coleoptera	Haliplidae	crawling water beetle	7
Coleoptera	Hydrophilidae	water scavenger beetle	1
Copepoda		copepod	1
Decapoda	Cambaridae	crayfish	1
Diptera	Chironomidae	midge	145
Diptera	Ephydridae	shore fly	4
Diptera	Simuliidae	black fly	105
Diptera	Tabanidae	deer/horse fly	1
Ephemeroptera	Caenidae	small squaregills mayfly	2
Ephemeroptera	Ephemeridae	common burrowing mayfly	1
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Coenagrionidae	narrowwinged damselfly	1
Odonata	Corduliidae	green eyed skimmer dragonfly	1
Odonata	Gomphidae	club-tailed dragonfly	4
Pharyngobdellida	Erpobdellidae	leech	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	3

Macroinvertebrate Biotic Index = 2007 = 8.638
2006 = 9.130
2005 = 5.762
2004 = 6.640

BIOLOGIST NOTE:
The upper third of this site had been changed by sediment from the east side of the road being washed downstream during the two spring floods of 2007. This altered some of the habitat for this site from past surveys. Lower fish numbers present and some species were absent in 2007. The IBI dropped from good in 2006 to fair in 2007. The MBI value is poor. Decent diversity of inverts but the community is made up of high numbers of tolerant insects, the midge and black fly. There is one more survey scheduled for the summer of 2008 as part of the five year survey plan.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -5%	Fine/silt -18%
Fine Gravel -18%	Course Gravel - 29%
Cobble - 16%	Boulder - 11%
Bedrock - 2%	

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	110	12	39
	Maximum	Minimum	Average
Right Bank -	110	7	39
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	23%	84%
Maximum	Minimum	Average

Left side of stream - 85%
Right side of stream - 88%
Center of stream - 78%

BANK (INCISED) HEIGHT:

5.2	2.3	3.6
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 49%
Riffle - 27%
Pool - 24%

141-RFM-07
123-RFM-06
076-RFM-05

Clear Fork Creek

Pottawatomie Co.

SE/4 of SE/4 SEC. 12, 6S, 10E

6/13/07

8/2/06

8/2/05

2007 STREAM COMPARISONS

	2005	2006	2007
Length of Sample Site	716 feet	715 feet	942 feet
Average Stream Depth	9 inches shallowest - 2 inches deepest - 1.7 feet	6 inches shallowest - 0 inches deepest - 1.3 feet	1.2 feet shallowest - 4 inches deepest - 2.1 feet
Stream Width	28.9' Maximum 3.6' Minimum 15.0' Average	27.0' Maximum 0.0' Minimum 11.4' Average	30.9' Maximum 10.4' Minimum 20.4' Average
Stream Flow	0.000 CFS	0.000 CFS	0.266 CFS

2007 WATER CHEMISTRY

	2005	2006	2007
pH	7.9	8.1	7.8
Alkalinity	226 mg/l	210 mg/l	231 mg/l
Conductivity	646 microSiemens	618 microSiemens	698 microSiemens
Total Dissolved Solids	323 mg/l	300 mg/l	340 mg/l
Nitrates	3.2 mg/l	0.6 mg/l	3.4 mg/l
Phosphorus	0.02 mg/l	0.04 mg/l	0.02 mg/l
Chlorides	12 mg/l	40 mg/l	24 mg/l
Ammonia	0.08 mg/l	0.17 mg/l	0.02 mg/l
Dissolved Oxygen	4.5 mg/l	4.4 mg/l	5.6 mg/l
Turbidity	17 FTU	50 FTU	13 FTU
Salinity	not available	not available	0.3
Water Temperature	73 F	79 F	70 F
Air Temperature	77 F	82 F	75 F

FISH POPULATION COMPARISONS						
	2005		2006		2007	
SPECIES	#	% BY #	#	% BY #	#	% BY #
black bullhead	7	0.3	1	0.04	2	0.12
bluegill	1	0.0	0	0.0	0	0.0
bluntnose minnow	42	2.1	738	26.1	318	18.8
carmine shiner	4	0.2	0	0.0	0	0.0
central stoneroller	1267	62.6	894	31.6	207	12.2
common shiner	76	3.8	105	3.7	104	6.1
creek chub	57	2.8	266	9.4	48	2.8
fathead minnow	26	1.3	249	8.8	210	12.4
green sunfish	26	1.3	62	2.2	50	3.0
johnny darter	71	3.5	17	0.6	8	0.5
orangespotted sunfish	24	1.2	9	0.3	9	0.5
orangethroat darter	103	5.1	50	1.8	49	2.9
red shiner	11	0.5	102	3.6	180	10.6
southern redbelly dace	142	7.0	158	5.6	255	15.1
Topeka shiner	133	6.6	117	4.1	227	13.4
white sucker	21	1.0	16	0.6	14	0.8
yellow bullhead	12	0.6	44	1.6	13	0.8
Total	**2023**	**100**	**2828**	**100**	**1694**	**100**

Index of Biotic Integrity = 95 95 82

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
pondhorn	No	Yes	No
pondmussel	No	Yes	No

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	24
Basomamatophora	Physidae	pouch snail	12
Coleoptera	Dytiscidae	predaceous diving beetle	16
Coleoptera	Elmidae	riffle beetle	10
Coleoptera	Haliplidae	crawling water beetle	2
Coleoptera	Hydrophilidae	water scavenger beetle	12
Collembola	Isotomidae	isotomid springtail	1
Decapoda	Cambaridae	crayfish	1
Diptera	Chironomidae	midge	111
Diptera	Culicidae	mosquito	5
Diptera	Dixidae	dixid midge	1
Diptera	Dolichopodidae	aquatic longlegged fly	1
Diptera	Simuliidae	black fly	4
Diptera	Stratiomyidae	aquatic soldier fly	1
Ephemeroptera	Baetidae	small minnow mayfly	6
Heteroptera	Gerridae	water strider	1
Odonata	Coenagrionidae	narrowwinged damselfly	1
Odonata	Libellulidae	common skimmer dragonfly	2
Plecoptera	Perlidae	common stonefly	1
Rhynchobdellida	Glossiphoniidae	leech	26

Macroinvertebrate Biotic Index - 2007 = 8.946
2006 = 7.547
2005 = 5.661

BIOLOGIST NOTE:

Less than 18 hours before conducting this survey, the stream was flowing at bankfull width from heavy rains that day. Water chemistry data was collected before it starting raining and the values recorded are adequate. The fish, macroinvertebrate, and physical data were collected the next day following the rain. Lower number of fish were collected in 2007, possibly due to more water present and more fish dispersal. In turn, Topeka Shiner, a federally endangered fish, almost doubled in numbers from previous two surveys. Not sure if this was due to the previous higher flows or that the survey was conducted in June instead of August as in the past surveys. The MBI value of 8.946 is considered very poor. This could be due to tolerant aquatic insect species being most abundant and the macroinvertebrate community is easily affected from high water events and hadn't had time to recover. There is one more survey scheduled for the summer of 2008 as part of the five year survey plan.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -2%	Fine/silt -7%
Fine Gravel -13%	Course Gravel - 9%
Cobble - 27%	Boulder - 24%
Bedrock - 18%	

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	130	9	48
	Maximum	Minimum	Average
Right Bank -	90	11	51
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

94%	38%	77%
Maximum	Minimum	Average

Left side of stream - 79%
Right side of stream - 80%
Center of stream - 73%

BANK (INCISED) HEIGHT:

9.1	4.2	7.1
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 44%	Riffle - 18%
Pool - 34%	Cascade - 3%

142-RFM-07
124-RFM-06
078-RFM-05
040-RFM-04

Clear Fork Creek

Pottawatomie Co.

NW/4 of NW/4 SEC. 18, 6S, 10

6/14/07

8/3/06

8/4/05

2007 STREAM COMPARISONS

	2004	2005	2006	2007
Length of Sample Site	492 feet	531 feet	531 feet	669 feet
Average Stream Depth	6 inches shallowest - 0 inches deepest - 3.8 feet	1 foot shallowest - 0 inches deepest - 4.4 feet	5 inches shallowest - 0 inches deepest - 2.8 feet	1.4 feet shallowest - 3 inches deepest - 4.9 feet
Stream Width	22.1' Maximum 3.9' Minimum 10.9' Average	20.7' Maximum 0.0' Minimum 13.7' Average	10.1' Maximum 0.0' Minimum 2.3' Average	20.8' Maximum 7.8' Minimum 16.3' Average
Stream Flow	0.000 CFS	0.000 CFS	0.000 CFS	0.518 CFS

2007 WATER CHEMISTRY

	2004	2005	2006	2007
pH	7.7	7.6	7.4	7.9
Alkalinity	181 mg/l	300 mg/l	63 mg/l	170 mg/l
Conductivity	609 microSiemens	712 microSiemens	448 microSiemens	451 microSiemens
Total Dissolved Solids	297 mg/l	355 mg/l	216 mg/l	218 mg/l
Nitrates	3.6 mg/l	2.3 mg/l	2.3 mg/l	1 mg/l
Phosphorus	0.04 mg/l	0.02 mg/l	0.04 mg/l	0.2 mg/l
Chlorides	4 mg/l	6 mg/l	62 mg/l	25 mg/l
Ammonia	0.07 mg/l	0.09 mg/l	0.25 mg/l	0.48 mg/l
Dissolved Oxygen	1.5 mg/l	4.3 mg/l	1.1 mg/l	6.3 mg/l
Turbidity	18 FTU	22 FTU	255 FTU	81 FTU
Salinity	not available	not available	not available	0.2%
Water Temperature	77 F	73 F	73 F	73 F
Air Temperature	73F	77F	77F	82 F

FISH POPULATION COMPARISONS

SPECIES	2004		2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #	#	% BY #
black bullhead	3	0.6	2	0.1	21	1.2	1	0.4
bluegill X green sunfish hybrid	1	0.2	0	0.0	0	0.0	0	0.0
blackstripe topminnow	0	0.0	0	0.0	0	0.0	1	0.4
bluntnose minnow	3	0.6	33	2.3	81	4.6	1	0.4
central stoneroller	206	43.3	280	19.5	160	9.1	80	35.6
common shiner	31	6.5	777	54.0	26	1.5	0	0.0
creek chub	67	14.1	86	6.0	113	6.4	7	3.1
fathead minnow	46	9.7	46	3.2	1058	59.9	34	15.1
green sunfish	17	3.6	23	1.6	94	5.3	19	8.4
johnny darter	15	3.2	26	1.8	3	0.2	2	0.9
largemouth bass	1	0.2	2	0.1	3	0.2	1	0.4
orangespotted sunfish	0	0.0	0	0.0	0	0.0	1	0.4
orangethroat darter	34	7.1	100	6.9	21	1.2	20	8.9
red shiner	19	4.0	23	1.6	84	4.8	19	8.4
southern redbelly dace	0	0.0	18	1.3	13	0.7	0	0.0
Topeka shiner	3	0.6	19	1.3	12	0.7	34	15.1
white sucker	26	5.5	4	0.3	49	2.8	2	0.9
yellow bullhead	4	0.8	0	0.0	29	1.6	3	1.3
Total	**476**	**100**	**1439**	**100**	**1767**	**100**	**225**	**100**
Index of Biotic Integrity =	98		86		87		88	

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
pondhorn	No	Yes	Yes

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	41
Basomamatophora	Physidae	pouch snail	23
Basomamatophora	Planorbidae	orb snail	2
Coleoptera	Dytiscidae	predaceous diving beetle	36
Coleoptera	Elmidae	riffle beetle	11
Coleoptera	Haliplidae	crawling water beetle	16
Decapoda	Cambaridae	crayfish	5
Diptera	Ceratopogonidae	biting midge	1
Diptera	Chironomidae	midge	189
Diptera	Ephydridae	shore fly	1
Diptera	Simuliidae	black fly	22
Ephemeroptera	Baetidae	small minnow mayfly	8
Ephemeroptera	Behningiidae	tuskless burrower mayfly	2
Ephemeroptera	Caenidae	small squaregills mayfly	2
Heteroptera	Corixidae	water boatman	6
Odonata	Gomphidae	club-tailed dragonfly	2
Odonata	Libellulidae	common skimmer dragonfly	3
Pharyngobdellida	Erpobdellidae	leech	2
Plecoptera	Perlidae	common stonefly	4
Plecoptera	Pteronarcyidae	giant stonefly	1
Rhynchobdellida	Glossiphoniidae	leech	1
Veneroida	Pisidiidae	peaclam	3

Macroinvertebrate Biotic Index - 2007 = 8.696
2006 = 8.379
2005 = 7.317
2004 = 6.641

BIOLOGIST NOTE:

Twenty-four hours before this site was surveyed, the stream was flowing at bankfull width. At the time of the survey the stream was near seasonal conditions. Nothing is out of the ordinary with the water chemistry results. The fish community in 2007 was the lowest number of fish collected out of all the past surveys. Yet, the IBI value remained constant with all the previous IBI values for this site. The Blackstripe Topminnow is a new record for this drainage. This species has never been recorded north of I-70 in Kansas. The MBI value is poor for this site with a value of 8.696. This could be due to the recent high water 24 hours earlier or the two spring floods of 2007. The macroinvertebrate community is dominated by the tolerant insect species known as a midge which will cause a poor value. There is one more survey scheduled for 2008 as part of the five year survey plan.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -4%	Fine/silt -24%
Fine Gravel -7%	Course Gravel - 24%
Cobble - 33%	Boulder - 2%
Other - 7%	

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	85	4	29
	Maximum	Minimum	Average
Right Bank -	65	8	35
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	59%	85%
Maximum	Minimum	Average

Left side of stream - 75%
Right side of stream - 94%
Center of stream - 87%

BANK (INCISED) HEIGHT:

5.5	2.3	3.9
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 33%	Riffle - 23%
Pool - 39%	Rapids - 2%
Cascade - 3	

143-RFM-07

Salt Creek

Sumner Co.

NW/4 of SE/4 SEC. 10, 34S, 2E

6/18/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	1.1 feet shallowest - 0 inches deepest - 3.1 feet		
Stream Width	15.3' Maximum	5.5' Minimum	10.8' Average
Stream Flow	0.141 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.4
Alkalinity	160 mg/l
Conductivity	1735 microSiemens
Total Dissolved Solids	866 mg/l
Nitrates	2.4 mg/l
Phosphorus	0.15 mg/l
Chlorides	123 mg/l
Ammonia	0.13 mg/l
Dissolved Oxygen	5.7 mg/l
Turbidity	27 FTU
Salinity	0.9 %
Water Temperature	73 F
Air Temperature	77 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	2	1.1
bluegill X orangespotted sunfish	1	0.5
central stoneroller	14	7.4
fathead minnow	2	1.1
golden shiner	3	1.6
green sunfish	54	28.7
largemouth bass	1	0.5
longear sunfish	1	0.5
orangespotted sunfish	11	5.9
red shiner	16	8.5
river carpsucker	3	1.6
sand shiner	37	19.7
suckermouth minnow	3	1.6
western mosquitofish	38	20.2
white crappie	1	0.5
yellow bullhead	1	0.5
Total	**188**	**100**

Index of Biotic Integrity = 92

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	16
Basomamatophora	Hydrobiidae	hydrobid snail	10
Basomamatophora	Physidae	pouch snail	3
Basomamatophora	Planorbidae	orb snail	4
Coleoptera	Dytiscidae	predaceous diving beetle	12
Coleoptera	Hydrophilidae	water scavenger beetle	1
Diptera	Chironomidae	midge	25
Diptera	Culicidae	mosquito	1
Ephemeroptera	Caenidae	small squaregills mayfly	73
Gordea	Gordiidae	horsehair worm	2
Heteroptera	Corixidae	water boatman	1
Odonata	Coenagrionidae	narrowwinged damselfly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	1
Veneroida	Pisidiidae	peaclam	7

Macroinvertebrate Biotic Integrity = 5.925

BIOLOGIST NOTE:
Water chemistry values are what is expected for this stream. Higher conductivity and total dissolved solid values and somewhat elevated chloride and salinity readings, hence the name Salt Creek. An IBI value of 92 is very good for the fish community. Decent diversity of fish species collected for this size of stream. The MBI value is borderline poor. There is not a large diversity of species collected, not sure if this is due to previous spring flooding of this site or the lack of habitat for the aquatic insects. As you can see from the above picture, some areas of the site didn't have any aquatic vegetation on the banks which is good habitat for macroinvertebrates. This is still a beneficial survey on a stream that had no previous information collected from it.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -47% Fine/silt -44%
Fine Gravel -9%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	76	9	38
	Maximum	Minimum	Average
Right Bank -	120	16	48
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	4%	83%
Maximum	Minimum	Average

Left side of stream - 79%
Right side of stream - 90%
Center of stream - 80%

BANK (INCISED) HEIGHT:

4.9	1.3	3.8
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 40%
Riffle - 23%
Pool - 37%

144-RFM-07

Geuda Springs

Sumner Co.

NE/4 of SE/4 SEC. 1, 34S, 2E

6/19/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	5 inches shallowest - 0.4 inches deepest - 1.7 feet		
Stream Width	8.8' Maximum	2.6' Minimum	5.1' Average
Stream Flow	0.031 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.1
Alkalinity	208 mg/l
Conductivity	32100 microSiemens
Total Dissolved Solids	19270 mg/l
Nitrates	1.5 mg/l
Phosphorus	0.35 mg/l
Chlorides	600 mg/l
Ammonia	0.22 mg/l
Dissolved Oxygen	6.9 mg/l
Turbidity	26 FTU
Salinity	20 %
Water Temperature	72 F
Air Temperature	79 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bigmouth buffalo	7	3.0
bluegill	1	0.4
green sunfish	21	8.9
largemouth bass	57	24.3
northern plains killifish	82	34.9
river carpsucker	2	0.9
western mosquitofish	65	27.7
Total	**235**	**100**

Index of Biotic Integrity = 89

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
giant floater	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Basomamatophora	Hydrobiidae	hydrobid snail	1
Basomamatophora	Physidae	pouch snail	5
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Hydrophilidae	water scavenger beetle	6
Diptera	Ceratopogonidae	biting midge	3
Diptera	Chironomidae	midge	8
Diptera	Ephydridae	shore fly	3
Heteroptera	Corixidae	water boatman	69
Odonata	Coenagrionidae	narrowwinged damselfly	2

Macroinvertebrate Biotic Integrity = 9.413

BIOLOGIST NOTE:
From the banks this stream looks like an average prairie stream, although this is one tough site for freshwater fish to exist. I discovered from talking to a couple guys working on the property to the north that there is a mineral spring at the upper end of the surveyed property. The water chemistry data reflects this. The conductivity, total dissolved solids, chlorides, and salinity were the highest values ever recorded by the stream monitoring program in the state. The salinity of the ocean is 3.5%, the salinity at this site was 20%. The picture above shows that after a recent high water event, the salty water has killed some of the vegetation in the flood prone area. This is expected when you have a mineral spring like this present. The high conductivity of the site made electrofishing virtually impossible. We were able to run a seine through the site. An IBI value of 89 is considered good. The northern plains killifish was the most abundant species collected. The northern plains killifish can actually withstand streams with higher salinity values where other fish can't. The western mosquitofish which is an introduced species to Kansas can also tolerate streams that many other fish species would die in. The largemouth bass and bluegill were probably washed downstream from the impoundment just upstream of the property. The bigmouth buffalo and river carpsucker probably came from the Arkansas River via Salt Creek during a high flow event that spring on Salt Creek. We found a few largemouth bass that were born that spring (young of year) that were dead along the banks that couldn't withstand the high salinity values.

The MBI value is considered very poor. There was a low diversity of aquatic insects collected. Like the fish, only the tolerant species are going to thrive in these conditions. Also, from looking at the picture above, there appears to have been a recent high flow event. When flooding occurs, the macroinvertebrate community can easily be affected. It was interesting and excellent data to be able to survey this spring that has both historical and environmental influence on the area.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -38% Fine/silt -62%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	80	4	29
	Maximum	Minimum	Average
Right Bank -	66	3	23
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

75%	0%	21%
Maximum	Minimum	Average

Left side of stream - 21%
Right side of stream - 21%
Center of stream - 27%

BANK (INCISED) HEIGHT:

3.6	1.6	2.2
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 55%
Riffle - 39%
Pool - 7%

145-RFM-07

Spring Creek

Cowley Co.

SW/4 of NE/4 SEC. 9, 34S, 3E

6/20/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	1 foot shallowest - 7 inches deepest - 2.0 feet		
Stream Width	18.5' Maximum	5.5' Minimum	13.3' Average
Stream Flow	3.288 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.3
Alkalinity	49 mg/l
Conductivity	165.8 microSiemens
Total Dissolved Solids	79.2 mg/l
Nitrates	0.3 mg/l
Phosphorus	0.29 mg/l
Chlorides	19 mg/l
Ammonia	0.23 mg/l
Dissolved Oxygen	8 mg/l
Turbidity	200 FTU
Salinity	0 %
Water Temperature	81 F
Air Temperature	104 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bigmouth buffalo	10	2.6
bluegill	15	3.9
bullhead minnow	2	0.5
channel catfish	2	0.5
common carp	2	0.5
emerald shiner	32	8.4
flathead catfish	1	0.3
gizzard shad	1	0.3
green sunfish	4	1.0
largemouth bass	7	1.8
longear sunfish	18	4.7
northern plains killifish	2	0.5
orangethroat darter	1	0.3
red shiner	201	52.5
sand shiner	60	15.7
shortnose gar	2	0.5
smallmouth buffalo	1	0.3
suckermouth minnow	11	2.9
western mosquitofish	7	1.8
white crappie	2	0.5
yellow bullhead	2	0.5
Total	**383**	**100**

Index of Biotic Integrity = 93

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
pondhorn	Yes	No	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Basomamatophora	Hydrobiidae	hydrobid snail	1
Coleoptera	Dytiscidae	predaceous diving beetle	8
Coleoptera	Hydrophilidae	water scavenger beetle	1
Decapoda	Cambaridae	crayfish	2
Diptera	Chironomidae	midge	33
Diptera	Simuliidae	black fly	13
Ephemeroptera	Baetidae	small minnow mayfly	2
Ephemeroptera	Caenidae	small squaregills mayfly	18
Odonata	Coenagrionidae	narrowwinged damselfly	1

Macroinvertebrate Biotic Integrity = 7.878

BIOLOGIST NOTE:
Went to survey this site at 6:30AM and the stream was up from 2.4 inches of rain the night before. Came back about 3:00PM that day and the stream had dropped 2 feet so we conducted our survey. Much of the water chemistry values have some rain effects. The turbidity is higher and many of the other parameters tested; the product is not as concentrated due to the rain water from upstream of the site. An IBI value of 93 is very good with a good diversity of fish species present. Many of the large fish species collected likely came from the Arkansas River, downstream about half mile, during the high flow event. The MBI value of 7.8 is considered poor with a low diversity of aquatic insects collected. Little significance should be put on these macroinvertebrate results due to the high flow just hours before collecting. Macroinvertebrates are easily displaced during high flow events. Possibly another survey at this exact site during more seasonal flow might be better to collect information of this stream.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -25% Fine/silt -71%
Fine Gravel -4%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	120	14	57
	Maximum	Minimum	Average
Right Bank -	90	16	43
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

91%	5%	39%
Maximum	Minimum	Average

Left side of stream - 52%
Right side of stream - 44%
Center of stream - 21%

BANK (INCISED) HEIGHT:

5.5	3.9	4.9
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 38%
Riffle - 35%
Pool - 19%
Rapids - 8%

146-RFM-07

North Branch Slate Creek

Sumner Co.

SW/4 of NE/4 SEC. 15, 30S, 4W

6/21/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	1.3 feet shallowest - 1 inch deepest - 2.8 feet		
Stream Width	13.7' Maximum	8.4' Minimum	10.7' Average
Stream Flow	1.475 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.3
Alkalinity	105 mg/l
Conductivity	292 microSiemens
Total Dissolved Solids	140 mg/l
Nitrates	1.5 mg/l
Phosphorus	0.19 mg/l
Chlorides	41 mg/l
Ammonia	0.1 mg/l
Dissolved Oxygen	6.4 mg/l
Turbidity	56 FTU
Salinity	0.1 %
Water Temperature	73 F
Air Temperature	75 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	4	1.2
black bullhead	1	0.3
bluegill	1	0.3
central stoneroller	4	1.2
green sunfish	132	39.1
largemouth bass	23	6.8
orangethroat darter	46	13.6
red shiner	47	13.9
sand shiner	35	10.4
suckermouth minnow	9	2.7
western mosquitofish	34	10.1
yellow bullhead	2	0.6
Total	**338**	**100**

Index of Biotic Integrity = 91

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
pondhorn	No	No	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	2
Basomamatophora	Physidae	pouch snail	8
Coleoptera	Dytiscidae	predaceous diving beetle	8
Coleoptera	Elmidae	riffle beetle	7
Coleoptera	Gyrinidae	whirligig beetle	2
Coleoptera	Hydrophilidae	water scavenger beetle	1
Decapoda	Cambaridae	crayfish	1
Diptera	Chironomidae	midge	14
Diptera	Ephydridae	shore fly	1
Diptera	Simuliidae	black fly	1
Ephemeroptera	Baetidae	small minnow mayfly	2
Ephemeroptera	Caenidae	small squaregills mayfly	12
Gordea	Gordiidae	horsehair worm	1
Heteroptera	Corixidae	water boatman	1
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Coenagrionidae	narrowwinged damselfly	2
Odonata	Gomphidae	club-tailed dragonfly	5
Pharyngobdellida	Erpobdellidae	leech	2
Trichoptera	Hydropsychidae	common netspinner caddisfly	1
Veneroida	Pisidiidae	peaclam	7

Macroinvertebrate Biotic Index = 6.621

BIOLOGIST NOTE:
Water chemistry values are normal for this area. Turbidity reading may be elevated due to rains earlier in the week and the previous week. The IBI value of 91 is very good. The Arkansas Darter, four collected, is a threatened fish in Kansas. This fish is usually found in sandy spring-fed streams of south-central Kansas. This area of the Slate Creek drainage is unique because only the extreme upper reaches of Slate Creek drainage is sandy and the rest of the drainage is silt. A physiographic layer of sand that lays across south-cental Kansas ends in this area of Sumner county. These are the first known records of Arkansas Darter in the Slate Creek drainage. The MBI value is considered poor for this site. Although, there seems to be an even number of individuals distributed throughout all the species. The presence of many tolerant species can cause a poor value.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -89% Fine/silt -11%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	71	7	43
	Maximum	Minimum	Average
Right Bank -	71	15	37
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

78%	0%	27%
Maximum	Minimum	Average

Left side of stream - 27%
Right side of stream - 36%
Center of stream - 17%

BANK (INCISED) HEIGHT:

3.6	1.6	2.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 70%
Riffle - 3%
Pool - 27%

147-RFM-07

Big Ditch

Sedgwick Co.

SW/4 of SE/4 SEC. 2, 29S, 1E

6/25/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	3.1 feet shallowest - 4 inches deepest - 4.9 feet		
Stream Width	189.2' Maximum	147.6' Minimum	170.5' Average
Stream Flow	25.058 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.9
Alkalinity	197 mg/l
Conductivity	810 microSiemens
Total Dissolved Solids	396 mg/l
Nitrates	0.2 mg/l
Phosphorus	0.12 mg/l
Chlorides	132 mg/l
Ammonia	0.01 mg/l
Dissolved Oxygen	5.9 mg/l
Turbidity	21 FTU
Salinity	0.4 %
Water Temperature	77 F
Air Temperature	84 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	1	0.0
bluegill	7	0.3
bullhead minnow	102	3.8
channel catfish	8	0.3
common carp	158	5.9
emerald shiner	77	2.9
gizzard shad	141	5.3
green sunfish	6	0.2
largemouth bass	80	3.0
logperch	2	0.1
longear sunfish	11	0.4
longnose gar	3	0.1
northern plains killifish	1	0.0
orangespotted sunfish	136	5.1
pealip redhorse	3	0.1
red shiner	1611	60.3
river carpsucker	47	1.8
sand shiner	68	2.5
silver chub	2	0.1
slenderhead darter	11	0.4
suckermouth minnow	140	5.2
western mosquitofish	4	0.2
white crappie	43	1.6
white perch	6	0.2
wiper (palmetto bass)	3	0.1
Total	**2671**	**100**

Index of Biotic Integrity = 85

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
		aquatic earthworm	1
Amphipoda	Gammaridae	scud	3
Basomamatophora	Physidae	pouch snail	2
Coleoptera	Dytiscidae	predaceous diving beetle	1
Coleoptera	Elmidae	riffle beetle	1
Diptera	Chironomidae	midge	38
Ephemeroptera	Caenidae	small squaregills mayfly	12
Heteroptera	Corixidae	water boatman	6
Odonata	Gomphidae	club-tailed dragonfly	1
Trichoptera	Lepidostromatidae	lepistomatid casemaker caddisfly	2

Macroinvertebrate Biotic Index = 8.947

BIOLOGIST NOTE:

This site was at higher than seasonal flow from previous rains. The Arkansas River which was downstream of this site about 200 meters also had increased flow which didn't allow the Big Ditch to drain as fast. The water chemistry values are normal for this site. An IBI value of 85 is very good. From the recent high flows, many species of fish from the Arkansas River may have moved into the Big Ditch. The Silver chub, an endangered fish in Kansas, was collected at this site along with a good diversity of other species of fish. A MBI value of 8.947 is very poor. The most dominant aquatic insect collected, the midge, is a tolerant species with can cause a poor value. Also, the recent high flows may have displaced some of the macroinvertebrate community.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -71% Fine/silt -20%
Fine Gravel -9%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	62	25	45
	Maximum	Minimum	Average
Right Bank -	70	20	42
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

31%	10%	24%
Maximum	Minimum	Average

Left side of stream - 37%
Right side of stream - 33%
Center of stream - 0%

BANK (INCISED) HEIGHT:

9.8	2.3	7.0
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 14%
Pool - 86%

148-RFM-07

Big Ditch

Sedgwick Co.

SW/4 of NE/4 SEC. 33, 28 S, 1E

6/26/07

2007 STREAM COMPARISONS

	2007
Length of Sample Site	984 feet
Average Stream Depth	2.9 feet shallowest - 5 inches deepest - 7.9 feet
Stream Width	162.5' Maximum 61.8' Minimum 89.1' Average
Stream Flow	14.329 CFS

2007 WATER CHEMISTRY

	2007
pH	8.1
Alkalinity	165 mg/l
Conductivity	762 microSiemens
Total Dissolved Solids	372 mg/l
Nitrates	0 mg/l
Phosphorus	0.1 mg/l
Chlorides	119 mg/l
Ammonia	0.02 mg/l
Dissolved Oxygen	5.4 mg/l
Turbidity	23 FTU
Salinity	0.3 %
Water Temperature	75 F
Air Temperature	77 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bluegill	22	0.5
bluegill X longear sunfish hybrid	2	0.0
bullhead minnow	177	3.9
channel catfish	11	0.2
common carp	8	0.2
emerald shiner	50	1.1
flathead catfish	15	0.3
freshwater drum	3	0.1
gizzard shad	27	0.6
goldfish	1	0.02
green sunfish	46	1.0
green sunfish X longear sunfish hybrid	4	0.1
largemouth bass	41	0.9
longear sunfish	54	1.2
longnose gar	5	0.1
northern plains killifish	4	0.1
orangespotted sunfish	294	6.5
pealip redhorse	1	0.02
quillback	1	0.02
red shiner	2847	63.3
river carpsucker	56	1.2
sand shiner	789	17.5
slenderhead darter	22	0.5
suckermouth minnow	10	0.2
white perch	3	0.1
wiper (palmetto bass)	4	0.1
Total	**4497**	**100**

Index of Biotic Integrity = 88

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	No	Yes	Yes
fragile papershell	No	No	Yes
giant floater	No	Yes	Yes
lilliput	No	No	Yes
pink papershell	No	Yes	No
white heelsplitter	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Diptera	Ceratopogonidae	biting midge	1
Diptera	Chironomidae	midge	132
Ephemeroptera	Baetidae	small minnow mayfly	7
Ephemeroptera	Caenidae	small squaregills mayfly	1
Gordea	Gordiidae	horsehair worm	6
Heteroptera	Corixidae	water boatman	2

Macroinvertebrate Biotic Index = 10.599

BIOLOGIST NOTE:
This site on the Big Ditch was just downstream of the turnpike below a low head dam structure. The previous few weeks this site had sustained high flows for a considerable amount of time. The water chemistry values are adequate for this site. The fish community was diverse with 26 species collected totaling 4,497 individuals. An IBI value of 88 is very good. The low head structure frequently causes a concentration area for fish trying to move upstream especially after high flows. The MBI value of 10.599 is very bad. The MBI value should not be accountable at this site for much of the high flow is a straight shot with high velocities in this stretch and displaces most of the aquatic insect community. Noting from the data, 88% of the aquatic insects collected were midges which is a tolerant invert. Also, from looking at the picture above, one bank is big rip rap and the other bank is clean sand. Not the best macroinvertebrate habitat for species diversity. The diversity of the freshwater mussel community is good to see with many recent specimens being collected.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -60% Fine/silt -2%
Fine Gravel -38%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	47	21	34
	Maximum	Minimum	Average
Right Bank -	14	1	7
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

0%	0%	0%
Maximum	Minimum	Average

Left side of stream - 0%
Right side of stream - 0%
Center of stream - 0%

BANK (INCISED) HEIGHT:

9.1	5.9	8.8
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 14%
Pool - 86%

149-RFM-07

Big Ditch

Sedgwick Co.

NE/4 of NE/4 SEC. 23, 28S, 1W

6/27/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	3 feet shallowest - 4 inches deepest - 6.9 feet		
Stream Width	91.7' Maximum	44.9' Minimum	70.6' Average
Stream Flow	44.188 CFS		

2007 WATER CHEMISTRY

	2007
pH	8.0
Alkalinity	726 mg/l
Conductivity	726 microSiemens
Total Dissolved Solids	354 mg/l
Nitrates	0.09 mg/l
Phosphorus	138 mg/l
Chlorides	0.03 mg/l
Ammonia	5.4 mg/l
Dissolved Oxygen	8 mg/l
Turbidity	8 FTU
Salinity	0.3 %
Water Temperature	75 F
Air Temperature	73 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black buffalo	2	0.1
black crappie	1	0.03
bluegill	42	1.3
bluegill X longear sunfish hybrid	1	0.03
bullhead minnow	112	3.4
channel catfish	3	0.1
common carp	32	1.0
flathead catfish	2	0.1
freshwater drum	3	0.1
gizzard shad	25	0.8
green sunfish	38	1.2
largemouth bass	17	0.5
logperch	4	0.1
longear sunfish	8	0.2
longnose gar	4	0.1
northern plains killifish	7	0.2
orangespotted sunfish	18	0.6
red shiner	2404	73.9
river carpsucker	21	0.6
sand shiner	431	13.3
slenderhead darter	19	0.6
suckermouth minnow	48	1.5
western mosquitofish	4	0.1
white crappie	5	0.2
yellow bullhead	1	0.0
Total	**3252**	**100**

Index of Biotic Integrity = 88

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	Yes	Yes	No
pink papershell	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	5
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Hydrophilidae	water scavenger beetle	1
Collembola	Poduridae	podurid springtail	1
Decapoda	Cambaridae	crayfish	1
Diptera	Ceratopogonidae	biting midge	1
Diptera	Chironomidae	midge	58
Diptera	Simuliidae	black fly	1
Ephemeroptera	Baetidae	small minnow mayfly	2
Ephemeroptera	Caenidae	small squaregills mayfly	9
Gordea	Gordiidae	horsehair worm	2
Heteroptera	Corixidae	water boatman	1
Mesogastropoda	Pleuroceridae	river snail	1
Odonata	Coenagrionidae	narrowwinged damselfly	3
Veneroida	Corbiculidae	Asian clam	3
Veneroida	Pisidiidae	peaclam	2

Macroinvertebrate Biotic Index = 9.125

BIOLOGIST NOTE:
This site on the Big Ditch was only 80% wadeable according to protocols with the deepest portion being almost seven feet deep. The flow was also higher than the seasonal norm at the time of the survey. Water chemistry values are normal for this site. IBI of 88 is very good with 25 species of fish making up 3,252 individuals collected. This is pretty good considering the percent wadeable of the site hindering fish collection. There was also an erosion control structure at the upper end of this site which acted as a fish barrier. The MBI value of 9.125 is very poor. Midges severely dominate the aquatic insect community which cause the score to be poor.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -85%	Fine/silt -7%
Fine Gravel -5%	Course Gravel - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	115	3	41
	Maximum	Minimum	Average
Right Bank -	67	9	33
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

33%	0%	14%
Maximum	Minimum	Average

Left side of stream - 30%
Right side of stream - 21%
Center of stream - 0%

BANK (INCISED) HEIGHT:

6.5	4.2	5.5
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 37%
Pool - 63%

150-RFM-07

Big Ditch

Sedgwick Co.

NW/4 of NW/4 SEC. 26, 27S, 1W

6/28/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	2.1 feet shallowest - 7 inches deepest - 3.7 feet		
Stream Width	118.0' Maximum	27.3' Minimum	53.3' Average
Stream Flow	7.380 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.6
Alkalinity	123 mg/l
Conductivity	647 microSiemens
Total Dissolved Solids	315 mg/l
Nitrates	2.9 mg/l
Phosphorus	0.03 mg/l
Chlorides	82 mg/l
Ammonia	0.14 mg/l
Dissolved Oxygen	4.6 mg/l
Turbidity	25 FTU
Salinity	0.3 %
Water Temperature	72 F
Air Temperature	68 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bluegill	103	3.0
bullhead minnow	30	0.9
channel catfish	5	0.1
common carp	16	0.5
flathead catfish	1	0.03
gizzard shad	459	13.4
green sunfish	6	0.2
largemouth bass	32	0.9
logperch	5	0.1
longear sunfish	23	0.7
longnose gar	3	0.1
northern plains killifish	9	0.3
orangespotted sunfish	3	0.1
quillback	9	0.3
red shiner	1937	56.5
river carpsucker	9	0.3
sand shiner	736	21.5
slenderhead darter	1	0.0
suckermouth minnow	32	0.9
western mosquitofish	5	0.1
white crappie	6	0.2
Total	**3430**	**100**

Index of Biotic Integrity = 89

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	Yes	Yes	No
giant floater	No	Yes	No
paper pondshell	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	8
Basomamatophora	Hydrobiidae	hydrobid snail	3
Basomamatophora	Physidae	pouch snail	1
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Hydrophilidae	water scavenger beetle	1
Collembola	Poduridae	podurid springtail	1
Diptera	Chironomidae	midge	49
Diptera	Simuliidae	black fly	15
Ephemeroptera	Baetidae	small minnow mayfly	2
Ephemeroptera	Caenidae	small squaregills mayfly	22
Gordea	Gordiidae	horsehair worm	3
Heteroptera	Corixidae	water boatman	19
Odonata	Coenagrionidae	narrowwinged damselfly	1
Pharyngobdellida	Erpobdellidae	leech	1
Veneroida	Corbiculidae	Asian clam	3
Veneroida	Pisidiidae	peaclam	1

Macroinvertebrate Biotic Index = 7.894

BIOLOGIST NOTE:
Previous night moderate rains and draining of Towne West Mall parking lot and other waterways into the Big Ditch at this location caused the survey site to be higher and multi-channeled. The survey was conducted on the seasonal (normal) flow channel from the Big Slough and Big Ditch confluence. Water chemistry values are adequate. The nitrate value seems to be elevated, likely due to runoff of lawn fertilizers into city drainages. IBI of 89 is very good with a good diversity of fish species and a large number of individuals collected. Only 90% of the site was electrofished due to the tote barge quit working. The MBI value of 49 is considered poor and as with all the other sites on the Big Ditch, the midge, a tolerant species, was the most dominant aquatic insect.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -91%	Fine/silt -5%
Fine Gravel -2%	Wood - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	81	5	24
	Maximum	Minimum	Average
Right Bank -	40	4	23
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

13%	0%	3%
Maximum	Minimum	Average

Left side of stream - 0%
Right side of stream - 10%
Center of stream - 0%

BANK (INCISED) HEIGHT:

7.2	3.3	4.1
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 37%
Riffle - 6%
Pool - 57%

151-RFM-07

Trib. South Fork Ninnescah River

Kingman Co.

SW/4 of SW/4 SEC. 31, 27S, 8W

7/3/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	9 inches shallowest - 4 inches deepest - 2.4 feet		
Stream Width	14.3' Maximum	6.5' Minimum	9.4' Average
Stream Flow	1.581 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.7
Alkalinity	151 mg/l
Conductivity	537 microSiemens
Total Dissolved Solids	260 mg/l
Nitrates	2.1 mg/l
Phosphorus	0.12 mg/l
Chlorides	50 mg/l
Ammonia	0.08 mg/l
Dissolved Oxygen	7.2 mg/l
Turbidity	9 FTU
Salinity	0.2 %
Water Temperature	68 F
Air Temperature	72 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	200	24.0
central stoneroller	69	8.3
fathead minnow	4	0.5
golden shiner	5	0.6
green sunfish	201	24.1
largemouth bass	2	0.2
northern plains killifish	35	4.2
orangethroat darter	58	7.0
red shiner	2	0.2
sand shiner	127	15.2
suckermouth minnow	1	0.1
western mosquitofish	118	14.1
yellow bullhead	12	1.4
Total	**834**	**100**

Index of Biotic Integrity = 98

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
giant floater	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	66
Basomamatophora	Hydrobiidae	hydrobid snail	2
Basomamatophora	Physidae	pouch snail	10
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Dytiscidae	predaceous diving beetle	6
Coleoptera	Elmidae	riffle beetle	11
Coleoptera	Gyrinidae	whirligig beetle	3
Coleoptera	Haliplidae	crawling water beetle	2
Coleoptera	Hydrophilidae	water scavenger beetle	7
Decapoda	Cambaridae	crayfish	3
Diptera	Ceratopogonidae	biting midge	2
Diptera	Chironomidae	midge	56
Diptera	Ephydridae	shore fly	1
Diptera	Simuliidae	black fly	8
Diptera	Tabanidae	deer/horse fly	1
Diptera	Tipulidae	crane fly	2
Ephemeroptera	Baetidae	small minnow mayfly	43
Ephemeroptera	Caenidae	small squaregills mayfly	25
Ephemeroptera	Heptageniidae	flatheaded mayfly	5
Heteroptera	Belostomatidae	giant water bug	1
Heteroptera	Corixidae	water boatman	6
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Calopterygidae	broadwinged damselfly	3
Odonata	Coenagrionidae	narrowwinged damselfly	4
Odonata	Gomphidae	club-tailed dragonfly	2
Pharyngobdellida	Erpobdellidae	leech	11
Rhynchobdellida	Glossiphoniidae	leech	3
Trichoptera	Hydropsychidae	common netspinner caddisfly	10
Trichoptera	Odontoceridae	strong case maker caddisfly	6
Tricladida	Planariidae	flatworm	1
Veneroida	Pisidiidae	peaclam	1

Macroinvertebrate Biotic Index = 6.062

BIOLOGIST NOTE:
The area the survey was conducted is the location that is planned for the new Highway 54 expansion and exit ramp. The water chemistry results are normal for this area of the state. An IBI value of 98 is very good for the fish community. Two-hundred Arkansas darters were collected and this fish is listed as a threatened fish in Kansas. Their range is mostly south-central Kansas in spring fed streams with a sandy substrate and overhanging bank vegetation. MBI value of 6.062 is considered poor or impacted. Many tolerant aquatic insect species were collected which may have caused the poor value. Although, there is an excellent diversity of aquatic insects present at this site. Another survey immediately before, during, and after the highway expansion construction may be interesting to see the affect it has on this section of stream.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -89%	Fine/silt -4%
Fine Gravel -5%	Other - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	69	14	40
	Maximum	Minimum	Average
Right Bank -	110	10	41
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	0%	16%
Maximum	Minimum	Average

Left side of stream - 10%
Right side of stream - 19%
Center of stream - 17%

BANK (INCISED) HEIGHT:

2.0	1.3	1.7
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 86%
Pool - 14%

152-RFM-07
107-RFM-06
071-RFM-05

Smoots Creek

Kingman Co.

SE/4 of SE/4 SEC. 21, 28S, 5W

07/12/05

07/10/06

07/09/07

2007 STREAM COMPARISONS

	2005	2006	2007
Length of Sample Site	984 feet	984 feet	984 feet
Average Stream Depth	1 foot shallowest -4 inches deepest - 2.1 feet	7 inches shallowest -2 inches deepest - 1.9 feet	1.2 feet shallowest -8 inches deepest - 2.2 feet
Stream Width	70.5' Maximum 20.7' Minimum 36.1' Average	37.7' Maximum 15.6' Minimum 27.3' Average	42.3' Maximum 25.3' Minimum 33.4' Average
Stream Flow	26.150 CFS	4.488 CFS	28.428 CFS

2006 WATER CHEMISTRY

	2005	2006	2007
pH	8.5	7.9	7.9
Alkalinity	217 mg/l	244 mg/l	244 mg/l
Conductivity	661 microSiemens	699 microSiemens	645 microSiemens
Total Dissolved Solids	332 mg/l	340 mg/l	313 mg/l
Nitrates	1.4 mg/l	1.5 mg/l	1.5 mg/l
Phosphorus	0.08 mg/l	0.06 mg/l	0.06 mg/l
Chlorides	37 mg/l	52 mg/l	185 mg/l
Ammonia	0.02 mg/l	0.09 mg/l	0.01 mg/l
Dissolved Oxygen	6.5 mg/l	4.2 mg/l	7.4 mg/l
Turbidity	14 FTU	10 FTU	24 FTU
Salinity	not available	not available	0.3 %
Water Temperature	77 F	72 F	72 F
Air Temperature	81 F	73 F	73 F

FISH POPULATION COMPARISONS

SPECIES	2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #
Arkansas darter	131	9.1	112	3.3	16	0.8
black bullhead	1	0.1	0	0.0	0	0.0
bluegill	16	1.1	7	0.2	9	0.4
bluntnose minnow	2	0.1	60	1.8	72	3.5
brook silverside	3	0.2	0	0.0	0	0.0
bullhead minnow	9	0.6	40	1.2	22	1.1
central stoneroller	185	12.8	428	12.5	195	9.4
channel catfish	1	0.1	8	0.2	32	1.6
common carp	2	0.1	0	0.0	9	0.4
emerald shiner	0	0.0	0	0.0	1	0.0
fathead minnow	2	0.1	0	0.0	0	0.0
gizzard shad	0	0.0	0	0.0	4	0.2
green sunfish	77	5.3	265	7.7	473	22.9
largemouth bass	25	1.7	0	0.0	35	1.7
longnose gar	0	0.0	0	0.0	4	0.2
northern plains killifish	83	5.8	520	15.2	139	6.7
orangespotted sunfish	3	0.2	0	0.0	1	0.0
orangethroat darter	25	1.7	53	1.5	12	0.6
red shiner	194	13.4	387	11.3	586	28.4
river carpsucker	1	0.1	0	0.0	5	0.2
sand shiner	303	21.0	1450	42.3	318	15.4
silver chub	1	0.1	0	0.0	0	0.0
slenderhead darter	1	0.1	0	0.0	0	0.0
suckermouth minnow	278	19.3	44	1.3	109	5.3
western mosquitofish	95	6.6	51	1.5	15	0.7
wiper (palmetto bass)	0	0.0	0	0.0	2	0.1
yellow bullhead	5	0.3	1	0.0	9	0.4
Total	**1443**	**100**	**3426**	**100**	**2064**	**100**
Index of Biotic Integrity =	92		85		99	

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	Yes	Yes	No
pondhorn	No	No	Yes

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
		aquatic earthworm	2
Basomamatophora	Hydrobiidae	hydrobid snail	1
Basomamatophora	Physidae	pouch snail	3
Basomamatophora	Planorbidae	orb snail	2
Coleoptera	Elmidae	riffle beetle	8
Coleoptera	Hydrophilidae	water scavenger beetle	1
Diptera	Ceratopogonidae	biting midge	6
Diptera	Chironomidae	midge	5
Diptera	Stratiomyidae	aquatic soldier fly	1
Ephemeroptera	Baetidae	small minnow mayfly	9
Ephemeroptera	Caenidae	small squaregills mayfly	56
Ephemeroptera	Heptageniidae	flatheaded mayfly	1
Ephemeroptera	Isonychiidae	brushlegged mayfly	5
Heteroptera	Belostomatidae	giant water bug	1
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Calopterygidae	broadwinged damselfly	3
Odonata	Gomphidae	club-tailed dragonfly	2
Rhynchobdellida	Glossiphoniidae	leech	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	6
Trichoptera	Odontoceridae	strong case maker caddisfly	3
Tricladida	Planariidae	flatworm	4
Veneroida	Corbiculidae	Asian clam	6

Macroinvertebrate Biotic Index 2005 = 4.733 2006 = 8.463 2007 = 5.047

BIOLOGIST NOTE:.

This is the third year of a five year study at this site from the affects of an ammonia pipeline break upstream in December of 2004. Water chemistry values have remained constant over the years. The chloride reading was elevated in 2007 possibly due to earlier spring flooding had eroded into some “salty” areas along the creek upstream of this site. Although the salinity reading is not abnormal for this area of the state. The IBI value of 99 is very good. Nice diversity of fish species. There seemed to be a drop in the number of Arkansas darters, a threatened fish in Kansas, collected in 2007. MBI value of 5.047 is considered good which fixed itself from the drought of 2006 value of 8.463. Good diversity and abundance of mayflies at this site.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand - 60%	Fine/silt - 2%
Fine Gravel -4%	Bedrock - 35%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	108	19	41
	Maximum	Minimum	Average
Right Bank -	137	16	63
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

21%	0%	9%
Maximum	Minimum	Average

Left side of stream - 11%
Right side of stream - 17%
Center of stream - 0%

BANK (INCISED) HEIGHT:

5.2	2.0	2.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 55%
Riffle - 17%
Pool - 28%

153-RFM-07
110-RFM-06
085-RFM-05

Smoots Creek

Kingman Co.

NE/4 of SE/4 SEC. 17, 27S, 6W

7/13/06

7/11/07

2007 STREAM COMPARISONS

	2005	2006	2007
Length of Sample Site	928 feet	604 feet	984 feet
Average Stream Depth	10 inches shallowest - 2 inches deepest - 2.2 feet	6 inches shallowest - 2 inches deepest - 1.6 feet	1.3 feet shallowest - 2 inches deepest - 2.9 feet
Stream Width	48.2' Maximum 9.8' Minimum 21.2' Average	30.9' Maximum 12.4' Minimum 21.2' Average	50.7' Maximum 18.9' Minimum 28.9' Average
Stream Flow	2.025 CFS	0.458 CFS	12.654 CFS

2007 WATER CHEMISTRY

	2005	2006	2007
pH	7.8	7.8	7.9
Alkalinity	218 mg/l	210 mg/l	197 mg/l
Conductivity	621 microSiemens	696 microSiemens	587 microSiemens
Total Dissolved Solids	312 mg/l	339 mg/l	285 mg/l
Nitrates	1.8 mg/l	1.2 mg/l	1.1 mg/l
Phosphorus	0.03 mg/l	0.09 mg/l	0.15 mg/l
Chlorides	38 mg/l	50 mg/l	30 mg/l
Ammonia	0.05 mg/l	0 mg/l	0.01 mg/l
Dissolved Oxygen	8.5 mg/l	5.2 mg/l	5.7 mg/l
Turbidity	7 FTU	7 FTU	17 FTU
Salinity	not available	not available	0.3
Water Temperature	55 F	75 F	72 F
Air Temperature	59 F	81 F	77 F

FISH POPULATION COMPARISONS

SPECIES	2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #
Arkansas darter	17	1.3	187	9.6	24	0.6
bluegill	1	0.1	29	1.5	21	0.5
bluntnose minnow	5	0.4	48	2.5	18	0.5
brook silverside	1	0.1	0	0.0	24	0.6
bullhead minnow	7	0.6	5	0.3	30	0.8
central stoneroller	105	8.3	77	4.0	89	2.2
channel catfish	0	0.0	0	0.0	8	0.2
common carp	2	0.2	0	0.0	29	0.7
emerald shiner	0	0.0	0	0.0	1	0.03
fathead minnow	1	0.1	0	0.0	0	0.0
gizzard shad	0	0.0	0	0.0	1	0.03
green sunfish	26	2.1	175	9.0	339	8.5
largemouth bass	23	1.8	8	0.4	108	2.7
longnose gar	0	0.0	0	0.0	1	0.03
northern plains killifish	139	11.0	735	37.8	378	9.5
orangespotted sunfish	1	0.1	0	0.0	0	0.0
orangethroat darter	4	0.3	12	0.6	8	0.2
quillback	0	0.0	0	0.0	5	0.1
red shiner	403	31.9	70	3.6	1200	30.0
river carpsucker	0	0.0	0	0.0	28	0.7
sand shiner	290	22.9	239	12.3	1583	39.6
suckermouth minnow	94	7.4	0	0.0	54	1.4
western mosquitofish	140	11.1	349	17.9	69	1.7
white crappie	0	0.0	0	0.0	1	0.03
yellow bullhead	5	0.4	12	0.6	6	0.2
Total	**1264**	**100**	**1946**	**100**	**3997**	**100**
Index of Biotic Integrity =	87		86		97	

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
lilliput	No	Yes	Yes
pondmussel	No	No	Yes

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	16
Basomamatophora	Hydrobiidae	hydrobid snail	1
Basomamatophora	Physidae	pouch snail	1
Bivalvia	Unionidae	lilliput mussel	3
Coleoptera	Elmidae	riffle beetle	4
Coleoptera	Haliplidae	crawling water beetle	3
Diptera	Chironomidae	midge	4
Diptera	Culicidae	mosquito	1
Ephemeroptera	Baetidae	small minnow mayfly	16
Ephemeroptera	Caenidae	small squaregills mayfly	23
Ephemeroptera	Heptageniidae	flatheaded mayfly	1
Ephemeroptera	Isonychiidae	brushlegged mayfly	20
Heteroptera	Belostomatidae	giant water bug	2
Heteroptera	Nepidae	water scorpion	2
Odonata	Calopterygidae	broadwinged damselfly	20
Odonata	Coenagrionidae	narrowwinged damselfly	2
Odonata	Gomphidae	club-tailed dragonfly	8
Trichoptera	Odontoceridae	strong case maker caddisfly	21

Macroinvertebrate Biotic Index - 2005 = 5.278
2006 = 6.514
2007 = 3.992

BIOLOGIST NOTE: This is the third year of a five year study at this site from the affects of an ammonia pipeline break downstream in December of 2004. Since this site was not affected by the spill it is used as a reference for other sites downstream. We always catch a lot a fish at this site for its size. There are some new fish species to the list and higher numbers in 2007, possibly due to the high flood events from earlier this summer and spring which promotes fish movement upstream. The Arkansas darter, which is a threatened fish in Kansas, went from 17 collected in 2005, 187 collected in 2006, then down to 24 collected in 2007. 2006 was a drought summer at this site and 2007 was a wet summer for this site. High flows may affect the fish movement of this species or its over-hanging vegetative habitat. This population change has occurred at other sites on Smoots Creek in 2007. The IBI value is very good, likely from catching twice as many fish and a few more species in 2007 . The MBI value of 3.992 is excellent, meaning there are no environmental impacts (pollution. oxygen depletion, etc) on this aquatic insect community. Not a large diversity of insect species, nonetheless, high numbers of intolerant insects and low numbers of pollution tolerant insects collected. This site is always good for collecting live or recent lilliput mussels.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand - 75% Fine Gravel - 24%
Fine - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	54	6	26
	Maximum	Minimum	Average
Right Bank -	126	5	37
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

43%	0%	5%
Maximum	Minimum	Average

Left side of stream - 3%
Right side of stream - 7%
Center of stream - 5%

BANK (INCISED) HEIGHT:

5.2	2.3	3.3
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 86%
Pool - 10%
Riffle - 4%

154-RFM-07
108-RFM-06
072-RFM-05

Smoots Creek

Kingman Co.

SE/4 of SE/4 SEC. 6, 28S, 5W

07/11/07

07/11/06

2007 STREAM COMPARISONS

	2005	2006	2007
Length of Sample Site	984 feet	732 feet	984 feet
Average Stream Depth	1 foot shallowest - 6 inches deepest - 2.5 feet	6 inches shallowest - 2 inches deepest - 3.1 feet	1.9 feet shallowest - 1 foot deepest - 3.9 feet
Stream Width	78.4' Maximum 19.7' Minimum 35.7' Average	43.6' Maximum 13.7' Minimum 29.1' Average	56.9' Maximum 30.2' Minimum 42.3' Average
Stream Flow	17.130 CFS	1.953 CFS	52.850 CFS

2007 WATER CHEMISTRY

	2005	2006	2007
pH	8.5	8.0	7.7
Alkalinity	192 mg/l	184 mg/l	154 mg/l
Conductivity	593 microSiemens	645 microSiemens	474 microSiemens
Total Dissolved Solids	296 mg/l	314 mg/l	229 mg/l
Nitrates	1.2 mg/l	1.4 mg/l	0.7 mg/l
Phosphorus	0.03 mg/l	0.05 mg/l	0.2 mg/l
Chlorides	21 mg/l	36 mg/l	14 mg/l
Ammonia	0.03 mg/l	0.04 mg/l	0.02 mg/l
Dissolved Oxygen	5.5 mg/l	3.8 mg/l	7.7 mg/l
Turbidity	18 FTU	9 FTU	30 FTU
Salinity	not available	not available	0.2 %
Water Temperature	73 F	72 F	81 F
Air Temperature	81 F	75 F	91 F

FISH POPULATION COMPARISONS

SPECIES	2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #
Arkansas darter	24	1.2	58	2.8	3	0.3
bluegill	40	1.9	55	2.7	15	1.6
bluegill X green sunfish hybrid	0	0.0	1	0.0	1	0.1
bluntnose minnow	2	0.1	33	1.6	9	0.9
brook silverside	25	1.2	0	0.0	0	0.0
bullhead minnow	26	1.3	45	2.2	5	0.5
central stoneroller	469	22.6	258	12.6	74	7.6
channel catfish	2	0.1	25	1.2	6	0.6
common carp	20	1.0	22	1.1	3	0.3
emerald shiner	0	0.0	0	0.0	1	0.1
fathead minnow	39	1.9	2	0.1	1	0.1
freshwater drum	2	0.1	2	0.1	0	0.0
gizzard shad	43	2.1	24	1.2	18	1.9
golden shiner	3	0.1	0	0.0	0	0.0
green sunfish	89	4.3	125	6.1	117	12.1
largemouth bass	40	1.9	10	0.5	10	1.0
longnose gar	2	0.1	0	0.0	0	0.0
northern plains killifish	192	9.3	240	11.7	36	3.7
orangespotted sunfish	5	0.2	3	0.1	0	0.0
orangethroat darter	13	0.6	38	1.8	10	1.0
quillback	3	0.1	1	0.0	2	0.2
red shiner	424	20.5	394	19.2	409	42.3
river carpsucker	0	0.0	2	0.1	3	0.3
sand shiner	227	11.0	488	23.7	195	20.1
suckermouth minnow	112	5.4	17	0.8	26	2.7
warmouth	0	0.0	5	0.2	1	0.1
western mosquitofish	243	11.7	191	9.3	16	1.7
white crappie	21	1.0	2	0.1	6	0.6
yellow bullhead	5	0.2	14	0.7	1	0.1
Total	**2071**	**100**	**2055**	**100**	**968**	**100**

Index of Biotic Integrity = 93 90 86

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
		roundworm	1
Amphipoda	Gammaridae	scud	20
Basomamatophora	Physidae	pouch snail	8
Basomamatophora	Planorbidae	orb snail	2
Coleoptera	Dytiscidae	predaceous diving beetle	2
Coleoptera	Elmidae	riffle beetle	6
Diptera	Chironomidae	midge	13
Diptera	Tabanidae	deer/horse fly	1
Ephemeroptera	Baetidae	small minnow mayfly	14
Ephemeroptera	Caenidae	small squaregills mayfly	53
Ephemeroptera	Heptageniidae	flatheaded mayfly	3
Heteroptera	Corixidae	water boatman	3
Heteroptera	Nepidae	water scorpion	1
Odonata	Calopterygidae	broadwinged damselfly	3
Odonata	Coenagrionidae	narrowwinged damselfly	6
Odonata	Libellulidae	common skimmer dragonfly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	1
Trichoptera	Odontoceridae	strong case maker caddisfly	9
Veneroida	Corbiculidae	Asian clam	11

Macroinvertebrate Biotic Index 2005 = 5.257
2006 = 5.045
2007 = 5.189

BIOLOGIST NOTE:

This is the third year of a five year study at this site from the affects of an ammonia pipeline break upstream in December of 2004. In 2007 the stream was up and turbid from a four inch rain several days before the survey. It was almost to the point the survey was called off but the stream had dropped in the last 24 hours. The considerable lower number of fish collected can attest to the turbid and more volume of water present. The IBI value of 83 is still very good with the value being consistent to the previous two surveys. The aquatic insect community, which is usually the first and most affected of aquatic organisms from flooding. still had a decent MBI value of 5.189. This value is consistent with the previous seasonal flow surveys at this site.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand - 49%	Fine/silt - 16%
Fine Gravel - 5%	Bedrock - 29%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	82	3	43
	Maximum	Minimum	Average
Right Bank -	69	7	37
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

73%	15%	35%
Maximum	Minimum	Average

Left side of stream - 55%
Right side of stream - 35%
Center of stream - 14%

BANK (INCISED) HEIGHT:

4.6	2.0	3.0
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 40%
Riffle - 13%
Pool - 47%

155-RFM-07

West Branch Little Sandy Creek

Barber Co.

SE/4 of SE/4 SEC. 2, 32S, 11W

7/17/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	1.3 feet shallowest - 8 inches deepest - 3.1 feet		
Stream Width	18.2' Maximum	8.1' Minimum	11.8' Average
Stream Flow	4.737 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.7
Alkalinity	235 mg/l
Conductivity	634 microSiemens
Total Dissolved Solids	308 mg/l
Nitrates	1.3 mg/l
Phosphorus	0.09 mg/l
Chlorides	27 mg/l
Ammonia	0.04 mg/l
Dissolved Oxygen	5.3 mg/l
Turbidity	9 FTU
Salinity	0.3 %
Water Temperature	70 F
Air Temperature	70 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
central stoneroller	253	83.8
common carp	1	0.3
green sunfish	20	6.6
largemouth bass	25	8.3
red shiner	2	0.7
yellow bullhead	1	0.3
Total	**302**	**100**

Index of Biotic Integrity = 64

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Acariformes		water mite	1
Amphipoda	Gammaridae	scud	5
Basomamatophora	Hydrobiidae	hydrobid snail	2
Basomamatophora	Physidae	pouch snail	32
Basomamatophora	Planorbidae	orb snail	24
Branchiura	Argulidae	common fish louse	2
Coleoptera	Dytiscidae	predaceous diving beetle	2
Coleoptera	Haliplidae	crawling water beetle	3
Coleoptera	Hydrophilidae	water scavenger beetle	2
Diptera	Ceratopogonidae	biting midge	1
Diptera	Chironomidae	midge	26
Diptera	Simuliidae	black fly	15
Ephemeroptera	Baetidae	small minnow mayfly	88
Ephemeroptera	Caenidae	small squaregills mayfly	4
Ephemeroptera	Ephemeridae	common burrowing mayfly	1
Heteroptera	Belostomatidae	giant water bug	1
Odonata	Aeshnidae	darner dragonfly	10
Odonata	Caenagrionidae	narrowwinged damselfly	5
Odonata	Calopterygidae	broadwinged damselfly	4
Odonata	Coenagrionidae	narrowwinged damselfly	2
Odonata	Libellulidae	common skimmer dragonfly	1
Pharyngobdellida	Erpobdellidae	leech	2
Rhynchobdellida	Glossiphoniidae	leech	2
Trichoptera	Hydropsychidae	common netspinner caddisfly	9
Veneroida	Corbiculidae	Asian clam	2
Veneroida	Pisidiidae	peaclam	11

Macroinvertebrate Biotic Index = 6.029

BIOLOGIST NOTES:

Surveys 155-RFM-07 and 156-RFM-07 were conducted to examine the affect on the aquatic life from a point source potential ditch runoff after a rain event. Site 155-RFM-07 was upstream of the runoff, 156-RFM-07 was downstream. There is not a significant difference between the two aquatic life populations or the water chemistry values. The water chemistry values are decent for this site. IBI value of 64 is fair, but normal for this area of the state. MBI value of 6.029 is considered impacted or poor but this value does not vary from the norm of MBI values from central to western Kansas. This is nice clear flowing stream with good stable vegetative banks.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -47% Fine/silt -49%
Fine Gravel -2% Course Gravel - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	37	2	12
	Maximum	Minimum	Average
Right Bank -	21	2	13
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

90%	0%	30%
Maximum	Minimum	Average

Left side of stream - 28%
Right side of stream - 28%
Center of stream - 32%

BANK (INCISED) HEIGHT:

1.0	0.7	0.9
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 84%
Riffle - 5%
Pool - 11%

156-RFM-07

West Branch Little Sandy Creek

Barber Co.

NE/4 of NE/4 SEC. 11, 32S, 11W

7/17/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	1.3 feet shallowest - 6 inches deepest - 3.4 feet		
Stream Width	30.6' Maximum	5.9' Minimum	11.6' Average
Stream Flow	5.230 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.8
Alkalinity	237 mg/l
Conductivity	644 microSiemens
Total Dissolved Solids	313 mg/l
Nitrates	1.2 mg/l
Phosphorus	0.07 mg/l
Chlorides	45 mg/l
Ammonia	0.02 mg/l
Dissolved Oxygen	6.6 mg/l
Turbidity	8 FTU
Salinity	0.3 %
Water Temperature	82 F
Air Temperature	122 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bluegill	1	0.2
central stoneroller	527	82.7
common carp	1	0.2
green sunfish	40	6.3
largemouth bass	57	8.9
northern plains killifish	3	0.5
red shiner	8	1.3
Total	**637**	**100**

Index of Biotic Integrity = 63

Freshwater Mussel Community

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	12
Basomamatophora	Hydrobiidae	hydrobid snail	6
Basomamatophora	Physidae	pouch snail	38
Basomamatophora	Planorbidae	orb snail	17
Coleoptera	Dytiscidae	predaceous diving beetle	3
Coleoptera	Haliplidae	crawling water beetle	13
Diptera	Chironomidae	midge	14
Diptera	Simuliidae	black fly	2
Ephemeroptera	Baetidae	small minnow mayfly	88
Ephemeroptera	Caenidae	small squaregills mayfly	3
Ephemeroptera	Isonychiidae	brushlegged mayfly	1
Heteroptera	Corixidae	water boatman	1
Heteroptera	Gerridae	water strider	1
Mesogastropoda	Pleuroceridae	river snail	1
Odonata	Aeshnidae	darner dragonfly	3
Odonata	Calopterygidae	broadwinged damselfly	1
Odonata	Coenagrionidae	narrowwinged damselfly	4
Odonata	Libellulidae	common skimmer dragonfly	2
Pharyngobdellida	Glossiphoniidae	leech	2
Rhynchobdellida	Glossiphoniidae	leech	1
Veneroida	Pisidiidae	peaclam	1

Macroinvertebrate Biotic Index = 5.900

BIOLOGIST NOTES:

Surveys 155-RFM-07 and 156-RFM-07 were conducted to examine the affect on the aquatic life from a point source potential ditch runoff after a rain event. Site 155-RFM-07 was upstream of the runoff, 156-RFM-07 was downstream. There is not a significant difference between two aquatic life populations or the water chemistry values between the two sites. The water chemistry values are decent for this site. IBI value of 63 is fair, but normal for this area of the state. MBI value of 5.900 is considered impacted or poor but this value does not vary from the norm of MBI values from central to western Kansas. There were more central stonerollers collected at this site than 155-RFM-07. Central stonerollers scrape algae off of rocks as a food source. From my personal observation there seemed to be slightly more algae present at this site. Often times an increase in ammonia or especially nitrates and sun can stimulate algae growth. The ammonia and nitrate values are not exceptionally high with agriculture fields nearby. Cannot see a difference in the two sites from the point source runoff. Possibly, if the surveys were conducted immediately following the event; might show more of an impact. The stream is recovering quickly if there is an impact.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -76% Fine/silt -18%
Fine Gravel -5%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	28	1	10
	Maximum	Minimum	Average
Right Bank -	14	2	7
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

43%	0%	9%
Maximum	Minimum	Average

Left side of stream - 9%
Right side of stream - 13%
Center of stream - 5%

BANK (INCISED) HEIGHT:

3.9	0.3	0.8
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 63%
Riffle - 3%
Pool - 34%

157-RFM-07

Bluff Creek

Clark Co.

NW/4 of NE/4 SEC. 1, 31S, 23W

7/18/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	8 inches shallowest - 3 inches deepest -1.6 feet		
Stream Width	46.8' Maximum	9.4' Minimum	17.6' Average
Stream Flow	0.520 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.5
Alkalinity	128 mg/l
Conductivity	552 microSiemens
Total Dissolved Solids	268 mg/l
Nitrates	3.8 mg/l
Phosphorus	0.07 mg/l
Chlorides	16 mg/l
Ammonia	0.1 mg/l
Dissolved Oxygen	3.7 mg/l
Turbidity	91 FTU
Salinity	0.2 %
Water Temperature	77 F
Air Temperature	77 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	1	0.1
black bullhead	16	1.4
bluegill	319	27.9
bluegill X green sunfish hybrid	22	1.9
central stoneroller	16	1.4
channel catfish	3	0.3
common carp	13	1.1
creek chub	1	0.1
fathead minnow	8	0.7
gizzard shad	50	4.4
golden shiner	23	2.0
green sunfish	133	11.6
green sunfish X longear sunfish hybrid	1	0.1
green sunfish X orangespotted sunfish hybrid	1	0.1
largemouth bass	88	7.7
longear sunfish	83	7.3
longear sunfish X orangespotted sunfish hybrid	2	0.2
orangespotted sunfish	19	1.7
red shiner	98	8.6
suckermouth minnow	55	4.8
western mosquitofish	177	15.5
white crappie	4	0.4
yellow bullhead	9	0.8
Total	**1142**	**100**

Index of Biotic Integrity = 93

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
		roundworm	1
Amphipoda	Gammaridae	scud	64
Basomamatophora	Hydrobiidae	hydrobid snail	3
Basomamatophora	Physidae	pouch snail	14
Basomamatophora	Planorbidae	orb snail	3
Coleoptera	Hydrophilidae	water scavenger beetle	4
Diptera	Chironomidae	midge	66
Diptera	Simuliidae	black fly	15
Diptera	Tabanidae	deer/horse fly	1
Ephemeroptera	Baetidae	small minnow mayfly	8
Ephemeroptera	Caenidae	small squaregills mayfly	7
Odonata	Calopterygidae	broadwinged damselfly	1
Odonata	Coenagrionidae	narrowwinged damselfly	8
Pharyngobdellida	Erpobdellidae	leech	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	74
Tricladida	Planariidae	flatworm	29
Veneroida	Pisidiidae	peaclam	3

Macroinvertebrate Biotic Integrity = 6.158

BIOLOGIST NOTES:

This site was conducted below Clark State Fishing Lake due to runoff from heavy spring rains in the upper watershed of Bluff Creek. This caused the lake to overflow at its spillway and into Bluff Creek. This stretch of Bluff creek had been fairly dry for a few years. IBI value of 93 is very good for the fish community but can be misleading when the fish community is made up of 62% fish introduced from Clark State Fishing Lake. A 15 pound channel catfish was collected in this survey which clearly came from the lake. One Arkansas darter, which is a threatened fish in Kansas, was collected. This fish may have come from a remnant spring somewhere in Bluff creek. The Arkansas darter during years that Bluff Creek had water was fairly common. One Creek Chub collected was an interesting find. The only place Creek Chubs have been collected were from Simmons Creek on the Couch Ranch, a tributary to Bluff Creek about three miles upstream of the lake. Past surveys above and below Simmons Creek tributary on Bluff Creek yielded no Creek Chubs collected. This may indicate the one creek chub collected came from flooding in Simmons Creek down Bluff Creek, through the lake, over the spillway, back into Bluff Creek from all the high flows in that watershed. This is just an assumption. MBI value of 6.158 is considered poor or impacted. Must remember this site went from virtually dry for a few years to one of the biggest floods in the decade for this area. The macroinvertebrate community adapts and reflects to these conditions. It is nice to see that the caddisfly, somewhat intolerant insect, is the most abundant species collected.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -20% Fine/silt -69%
Fine Gravel -5% Course Gravel - 4%
Boulder - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	31	7	16
	Maximum	Minimum	Average
Right Bank -	31	4	14
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

79%	4%	42%
Maximum	Minimum	Average

Left side of stream - 45%
Right side of stream - 34%
Center of stream - 45%

BANK (INCISED) HEIGHT:

3.3	1.3	2.5
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 82%
Riffle - 2%
Pool - 16%

158-RFM-07

Trib. South Fork Ninnescah River

Kingman Co.

NE/4 of NW/4 SEC. 30, 27S, 10W

7/19/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	7 inches shallowest - 2inches deepest - 1.0 foot		
Stream Width	13.7' Maximum	0.3' Minimum	4.9' Average
Stream Flow	0.300 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.5
Alkalinity	119 mg/l
Conductivity	425 microSiemens
Total Dissolved Solids	205 mg/l
Nitrates	5.1 mg/l
Phosphorus	0.09 mg/l
Chlorides	26 mg/l
Ammonia	0.06 mg/l
Dissolved Oxygen	7.2 mg/l
Turbidity	7 FTU
Salinity	0.2 %
Water Temperature	68 F
Air Temperature	72 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	2136	95.1
central stoneroller	1	0.04
green sunfish	1	0.04
largemouth bass	2	0.1
northern plains killifish	25	1.1
orangethroat darter	1	0.04
sand shiner	1	0.04
southern redbelly dace	16	0.7
western mosquitofish	63	2.8
Total	**2246**	**100**

Index of Biotic Integrity = 115

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	19
Basomamatophora	Physidae	pouch snail	8
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Dytiscidae	predaceous diving beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	2
Decapoda	Cambaridae	crayfish	1
Diptera	Chironomidae	midge	21
Diptera	Dixidae	dixid midge	2
Diptera	Ptychopteridae	phantom crane fly	2
Diptera	Simuliidae	black fly	7
Ephemeroptera	Baetidae	small minnow mayfly	1
Heteroptera	Corixidae	water boatman	1
Heteroptera	Gerridae	water strider	1
Mesogastropoda	Pleuroceridae	river snail	1
Odonata	Aeshnidae	darner dragonfly	2
Odonata	Calopterygidae	broadwinged damselfly	3
Odonata	Coenagrionidae	narrowwinged damselfly	23
Pharyngobdellida	Erpobdellidae	leech	4
Rhynchobdellida	Glossiphoniidae	leech	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	1
Tricladida	Planariidae	flatworm	1
Veneroida	Pisidiidae	peaclam	6

Macroinvertebrate Biotic Index = 6.831

BIOLOGIST NOTES:

This is a very unique stream for this part of Kansas. This stream is spring fed by some good quality water because most springs this close to the South Fork Ninnescah River usually have a high conductivity readings. The chloride and salinity readings are low for an area that has major oil fields nearby which often cause salt to get into ground-water beds. The nitrate levels are elevated. This maybe due to some runoff of fertilizer into the stream from crops fields higher up in the stream's watershed. This usually occurs after heavy rains on exposed fields. IBI value of 115 is beyond exceptional. Being a small stream and catching high numbers and the right species of fish drove this value up. Southern Redbelly dace are very rare for this area. Although some populations occur in spring fed streams of Pratt, Kiowa, and Barber counties in the Medicine River headwaters. The southern redbelly dace native range is the flint hills region of eastern Kansas. Not sure if this is an introduced or a remnant native population. This would require genetic work. The dace are a sensitive fish species and their population seems to be doing fine in this stream. A total of 2,136 Arkansas darters were collected. The Arkansas darter is a threatened species in Kansas. This species was made up of 419 adults and 1,717 juveniles. Therefore, the conditions in this stream was optimal for a good spawn this spring. Another interesting note on the Arkansas darter, was their habitat is usually a spring-fed stream with sandy substrate and overhanging vegetation and an open canopy (treeless). This site was mostly covered with tree canopy. MBI value is considered poor or impacted. There was good habitat in this stream for aquatic insects but the population contained many tolerant species. Must remember father west in Kansas the values tend to be higher.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -45% Fine/silt -53%
Fine Gravel -2%

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	37	3	15
	Maximum	Minimum	Average
Right Bank -	80	2	18
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	75%	93%
Maximum	Minimum	Average

Left side of stream - 93%
Right side of stream - 95%
Center of stream - 90%

BANK (INCISED) HEIGHT:

1.6	0.7	1.2
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 91%
Riffle - 5%
Pool - 3%

159-RFM-07
109-RFM-06
073-RFM-05

Smoots Creek

Kingman Co.

NE/4 of SE/4 SEC. 17, 28S, 5W

07/14/05

07/12/06

07/23/07

2007 STREAM COMPARISONS

	2005	2006	2007
Length of Sample Site	984 feet	518 feet	984 feet
Average Stream Depth	1.3 feet shallowest -7 inches deepest - 3.9 feet	8 inches shallowest -4 inches deepest -2.9 feet	1.1 feet shallowest -7 inches deepest -1.9 feet
Stream Width	34.4' Maximum 22.0' Minimum 27.6' Average	25.4' Maximum 9.4' Minimum 16.4' Average	49.7' Maximum 22.7' Minimum 31.8' Average
Stream Flow	16.522 CFS	2.546 CFS	12.776 CFS

2007 WATER CHEMISTRY

	2005	2006	2007
pH	8.4	8.0	7.9
Alkalinity	226 mg/l	223 mg/l	196 mg/l
Conductivity	621 microSiemens	668 microSiemens	638 microSiemens
Total Dissolved Solids	310 mg/l	325 mg/l	310 mg/l
Nitrates	1.4 mg/l	1.4 mg/l	3.1 mg/l
Phosphorus	0.09 mg/l	0.02 mg/l	0.37 mg/l
Chlorides	25 mg/l	86 mg/l	33 mg/l
Ammonia	0.01 mg/l	0.09 mg/l	0.07 mg/l
Dissolved Oxygen	5.4 mg/l	5.6 mg/l	7.0 mg/l
Turbidity	16 FTU	12 FTU	9 FTU
Salinity	not available	not available	0.3 %
Water Temperature	75 F	75 F	75 F
Air Temperature	82 F	77 F	81 F

FISH POPULATION COMPARISONS

SPECIES	2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #
Arkansas darter	13	1.5	30	3.0	3	0.3
black bullhead	1	0.1	0	0.0	0	0.0
bluegill	4	0.5	11	1.1	0	0.0
bluntnose minnow	0	0.0	2	0.2	1	0.1
brook silverside	6	0.7	3	0.3	0	0.0
bullhead minnow	25	3.0	52	5.2	15	1.5
central stoneroller	72	8.5	130	12.9	51	5.1
channel catfish	13	1.5	13	1.3	11	1.1
common carp	2	0.2	0	0.0	0	0.0
fathead minnow	77	9.1	0	0.0	2	0.2
flathead catfish	1	0.1	1	0.1	5	0.5
freshwater drum	0	0.0	1	0.1	0	0.0
green sunfish	64	7.6	75	7.4	363	35.9
largemouth bass	7	0.8	2	0.2	3	0.3
northern plains killifish	77	9.1	79	7.8	19	1.9
orangespotted sunfish	1	0.1	0	0.0	0	0.0
orangethroat darter	5	0.6	48	4.8	23	2.3
red shiner	208	24.6	281	27.9	427	42.3
sand shiner	180	21.3	194	19.2	69	6.8
suckermouth minnow	52	6.1	13	1.3	12	1.2
western mosquitofish	35	4.1	67	6.6	1	0.1
white crappie	2	0.2	0	0.0	0	0.0
yellow bullhead	1	0.1	6	0.6	5	0.5
Total	**846**	**100**	**1008**	**100**	**1010**	**100**
Index of Biotic Integrity =	90		91		85	

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	No	Yes	No
giant floater	No	No	Yes
lilliput	No	No	Yes
pimpleback	No	Yes	No
pondhorn	No	No	Yes

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	3
Basomamatophora	Hydrobiidae	hydrobid snail	1
Basomamatophora	Physidae	pouch snail	12
Coleoptera	Dytiscidae	predaceous diving beetle	11
Coleoptera	Elmidae	riffle beetle	18
Coleoptera	Hydrophilidae	water scavenger beetle	1
Decapoda	Cambaridae	crayfish	2
Diptera	Chironomidae	midge	4
Diptera	Empididae	aquatic dance fly	1
Ephemeroptera	Baetidae	small minnow mayfly	3
Ephemeroptera	Caenidae	small squaregills mayfly	48
Ephemeroptera	Heptageniidae	flatheaded mayfly	13
Ephemeroptera	Isonychiidae	brushlegged mayfly	17
Heteroptera	Belostomatidae	giant water bug	1
Odonata	Calopterygidae	broadwinged damselfly	3
Odonata	Coenagrionidae	narrowwinged damselfly	10
Odonata	Gomphidae	club-tailed dragonfly	9
Odonata	Libellulidae	common skimmer dragonfly	4
Rhynchobdellida	Glossiphoniidae	leech	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	25
Trichoptera	Odontoceridae	strong case maker caddisfly	1
Veneroida	Corbiculidae	Asian clam	10
Veneroida	Pisidiidae	peaclam	2

Macroinvertebrate Biotic Index - 2005 = 4.383 2006 = 5.047 2007 = 4.717

BIOLOGIST NOTE:

This is the third year of a five year study at this site from the affects of an ammonia pipeline break upstream in December of 2004. This site had experienced flooding the spring of 2007 and many of the pools that were present in 2005 and 2006 had been filled with sand. There was still a good diversity and high number of fish collected. Although the IBI value had dropped from previous surveys, a value of 85 is still considered good. A MBI value of 4.717 is considered good to excellent for this area of the state. The values have remained consistent over the years even with some recent flooding of the site which can influence the aquatic insect community.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand - 85% Fine/silt -4%
Fine Gravel - 11%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	111	5	39
	Maximum	Minimum	Average
Right Bank -	66	9	32
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

98%	29%	81%
Maximum	Minimum	Average

Left side of stream - 84%
Right side of stream - 88%
Center of stream - 70%

BANK (INCISED) HEIGHT:

5.2	1.6	3.9
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 81%
Pool - 19%

160-RFM-07
105-RFM-06
070-RFM-05

Smoots Creek

Kingman Co.

SE/4 of SW/4 SEC. 26, 28S, 5W

07/11/05

07/06/06

07/24/07

2007 STREAM COMPARISONS

	2005	2006	2007
Length of Sample Site	984 feet	984 feet	984 feet
Average Stream Depth	1.1 feet shallowest - 4 inches deepest - 2.1 feet	1.1 feet shallowest - 4 inches deepest - 2.8 feet	1.5 feet shallowest - 5 inches deepest - 3.4 feet
Stream Width	84.6' Maximum 29.5' Minimum 56.1' Average	76.1' Maximum 28.0' Minimum 54.5' Average	92.0' Maximum 32.2' Minimum 60.6' Average
Stream Flow	27.850 CFS	3.726 CFS	12.370 CFS

2007 WATER CHEMISTRY

	2005	2006	2007
pH	8.4	8.0	7.8
Alkalinity	217 mg/l	202 mg/l	194 mg/l
Conductivity	670 microSiemens	718 microSiemens	698 microSiemens
Total Dissolved Solids	336 mg/l	650 mg/l	340 mg/l
Nitrates	1.6 mg/l	2 mg/l	1.6 mg/l
Phosphorus	0.06 mg/l	0.02 mg/l	40 mg/l
Chlorides	41 mg/l	97 mg/l	97 mg/l
Ammonia	0 mg/l	0.02 mg/l	0.05 mg/l
Dissolved Oxygen	5.4 mg/l	5.4 mg/l	5.8 mg/l
Turbidity	19 FTU	8 FTU	10 FTU
Salinity	not available	not available	0.3 %
Water Temperature	75 F	70 F	73 F
Air Temperature	77 F	72 F	73 F

FISH POPULATION COMPARISONS

SPECIES	2005		2006		2007	
	#	% BY #	#	% BY #	#	% BY #
Arkansas darter	1	0.1	11	0.3	0	0.0
bigmouth buffalo	0	0.0	1	0.0	0	0.0
black crappie	0	0.0	1	0.0	1	0.1
bluegill	4	0.3	64	2.0	42	2.7
bluntnose minnow	19	1.2	88	2.8	8	0.5
brook silverside	9	0.6	0	0.0	3	0.2
bullhead minnow	95	6.1	674	21.2	82	5.2
central stoneroller	40	2.6	287	9.0	89	5.6
channel catfish	4	0.3	49	1.5	33	2.1
common carp	9	0.6	20	0.6	0	0.0
emerald shiner	2	0.1	0	0.0	1	0.1
fathead minnow	3	0.2	26	0.8	6	0.4
freshwater drum	3	0.2	10	0.3	1	0.1
gizzard shad	7	0.4	79	2.5	22	1.4
green sunfish	28	1.8	99	3.1	49	3.1
largemouth bass	8	0.5	17	0.5	8	0.5
longear sunfish	0	0.0	0	0.0	3	0.2
longnose gar	3	0.2	0	0.0	3	0.2
northern plains killifish	24	1.5	47	1.5	7	0.4
orangespotted sunfish	3	0.2	7	0.2	0	0.0
orangethroat darter	5	0.3	15	0.5	1	0.1
quillback	0	0.0	13	0.4	1	0.1
red shiner	666	42.6	524	16.5	654	41.3
river carpsucker	1	0.1	37	1.2	13	0.8
sand shiner	448	28.7	658	20.7	465	29.4
saugeye	0	0.0	1	0.0	0	0.0
smallmouth buffalo	0	0.0	1	0.0	0	0.0
silver chub	2	0.1	0	0.0	0	0.0
slenderhead darter	1	0.1	0	0.0	2	0.1
suckermouth minnow	135	8.6	375	11.8	75	4.7
warmouth	0	0.0	22	0.7	1	0.1
western mosquitofish	41	2.6	0	0.0	0	0.0
white crappie	0	0.0	5	0.2	13	0.8
white perch	0	0.0	15	0.5	2	0.1
wiper	0	0.0	5	0.2	2	0.1
yellow bullhead	1	0.1	1	0.0	0	0.0
Total	**1562**	**100**	**3183**	**100**	**1584**	**100**
Index of Biotic Integrity =	90		87		92	

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

2007

Order	Family	Common Name	Number
Acariformes		water mite	2
Amphipoda	Gammaridae	scud	5
Basomamatophora	Physidae	pouch snail	2
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Dytiscidae	predaceous diving beetle	3
Coleoptera	Elmidae	riffle beetle	15
Coleoptera	Haliplidae	crawling water beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	5
Diptera	Chironomidae	midge	64
Diptera	Ephydridae	shore fly	1
Diptera	Simuliidae	black fly	2
Ephemeroptera	Baetidae	small minnow mayfly	59
Ephemeroptera	Caenidae	small squaregills mayfly	136
Ephemeroptera	Heptageniidae	flatheaded mayfly	12
Ephemeroptera	Isonychiidae	brushlegged mayfly	69
Heteroptera	Corixidae	water boatman	9
Megaloptera	Corydalidae	fishfly/dobson fly	1
Odonata	Calopterygidae	broadwinged damselfly	1
Odonata	Coenagrionidae	narrowwinged damselfly	2
Odonata	Gomphidae	club-tailed dragonfly	12
Trichoptera	Brachycentridae	humpless casemaker caddisfly	2
Trichoptera	Hydropsychidae	common netspinner caddisfly	12
Trichoptera	Odontoceridae	strong case maker caddisfly	1
Veneroida	Corbiculidae	Asian clam	8
Veneroida	Pisidiidae	peaclam	2

Macroinvertebrate Biotic Index = 2005 = 4.655
2006 = 4.807
2007 = 5.177

BIOLOGIST NOTE:

This is the third year of a five year study at this site from the affects of an ammonia pipeline break upstream in December of 2004. This site always has a high diversity of fish species being this close to the confluence of the South Fork Ninnescah River downstream about 200 meters. Also, several high flow events in Smoots creek has caused fish movement out of the river and upstream into Smoots Creek. The IBI value is very good. Although, as with other sites on Smoots Creek, Arkansas darter numbers were lower or none collected. This may be due to the high water affecting their habitat and the survey being conducted after flood waters had receded. A MBI value of 5.177 is considered good or moderate impact on the site. For this part of the state and after a recent very high flow event, this is a stable and quickly recuperating aquatic insect community. The flow comes through this site fairly quickly then slows down when it gets closer to the confluence of the South Fork Ninnescah River.

2006 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand - 49%
Fine - 5%
Cobble - 4%
Bedrock - 40%
Other - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	105	4	38
	Maximum	Minimum	Average
Right Bank -	140	5	38
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

70%	6%	35%
Maximum	Minimum	Average

Left side of stream - 52%
Right side of stream - 40%
Center of stream - 12%

BANK (INCISED) HEIGHT:

5.5	2.0	3.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 63%
Riffle - 17%
Pool - 16%
Cascade - 2%
Rapid - 2%

161-RFM-07

South Fork Ninnescah River

Kingman Co.

NW/4 of NE/4 SEC. 3, 28S, 9W

7/25/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	1.9 feet shallowest - 1 foot deepest - 3.0 feet		
Stream Width	133.9' Maximum	74.1' Minimum	112.3' Average
Stream Flow	82.251 CFS		

2007 WATER CHEMISTRY

	2007
pH	8.2
Alkalinity	162 mg/l
Conductivity	1331 microSiemens
Total Dissolved Solids	659 mg/l
Nitrates	1.9 mg/l
Phosphorus	0.21 mg/l
Chlorides	372 mg/l
Ammonia	0.05 mg/l
Dissolved Oxygen	5.9 mg/l
Turbidity	25 FTU
Salinity	0.6 %
Water Temperature	73 F
Air Temperature	73 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	12	1.1
bluntnose minnow	7	0.7
brook silverside	13	1.2
bullhead minnow	71	6.7
central stoneroller	2	0.2
channel catfish	9	0.8
common carp	11	1.0
flathead catfish	5	0.5
freshwater drum	1	0.1
green sunfish	76	7.1
largemouth bass	4	0.4
northern plains killifish	37	3.5
quillback	2	0.2
red shiner	307	28.8
river carpsucker	17	1.6
sand shiner	466	43.8
suckermouth minnow	3	0.3
western mosquitofish	21	2.0
white crappie	1	0.1
Total	**1065**	**100**

Index of Biotic Integrity = 80

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
pondhorn	No	No	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
Basomamatophora	Hydrobiidae	hydrobid snail	2
Basomamatophora	Physidae	pouch snail	2
Coleoptera	Elmidae	riffle beetle	16
Coleoptera	Hydrophilidae	water scavenger beetle	1
Decapoda	Cambaridae	crayfish	1
Diptera	Ceratopogonidae	biting midge	1
Diptera	Chironomidae	midge	28
Diptera	Simuliidae	black fly	1
Ephemeroptera	Baetidae	small minnow mayfly	29
Ephemeroptera	Caenidae	small squaregills mayfly	86
Ephemeroptera	Heptageniidae	flatheaded mayfly	4
Ephemeroptera	Isonychiidae	brushlegged mayfly	13
Odonata	Calopterygidae	broadwinged damselfly	17
Odonata	Coenagrionidae	narrowwinged damselfly	2
Odonata	Gomphidae	club-tailed dragonfly	9
Trichoptera	Hydropsychidae	common netspinner caddisfly	47
Trichoptera	Odontoceridae	strong case maker caddisfly	33
Veneroida	Corbiculidae	Asian clam	5

Macroinvertebrate Biotic Index = 4.812

BIOLOGIST NOTE:
This survey was the upper control site of a bank stabilization project completed the winter of December 2006 immediately downstream of this site.

Sustained flooding was present at this site earlier in the summer. The IBI value of 80 is considered good and for this wide of stream in south-central Kansas a value of 80 is actually a very decent value. The MBI value of 4.812 is considered good with moderate impacts. Like the fish community this is a very good value for a stream in south-central Kansas consisting mostly of sandy substrate. Many intolerant aquatic insects make up the majority of the insects collected even though there isn't as large of a species diversity as in some streams.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -83% Fine/silt -7%
Fine Gravel -9%

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	127	42	89
	Maximum	Minimum	Average
Right Bank -	110	10	53
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

33%	6%	19%
Maximum	Minimum	Average

Left side of stream - 38%
Right side of stream - 20%
Center of stream - 0%

BANK (INCISED) HEIGHT:

4.9	2.6	3.8
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 27%
Pool - 73%

162-RFM-07

North Fork Ninnescah River

Sedgwick Co.

NE/4 of NE/4 SEC. 18, 27S, 4W

7/26/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	1.5 feet shallowest - 4 inches deepest - 3.9 feet		
Stream Width	98.8' Maximum	29.9' Minimum	63.0' Average
Stream Flow	2.900 CFS		

2007 WATER CHEMISTRY

	2007
pH	8.0
Alkalinity	209 mg/l
Conductivity	834 microSiemens
Total Dissolved Solids	408 mg/l
Nitrates	0.2 mg/l
Phosphorus	0.04 mg/l
Chlorides	101 mg/l
Ammonia	0.07 mg/l
Dissolved Oxygen	5.7 mg/l
Turbidity	27 FTU
Salinity	0.4 %
Water Temperature	75 F
Air Temperature	73 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bigmouth buffalo	40	0.6
black buffalo	14	0.2
black crappie	16	0.3
bluegill	437	6.8
bluegill X green sunfish hybrid	3	0.05
brook silverside	1	0.02
bullhead minnow	242	3.8
central stoneroller	2	0.03
channel catfish	111	1.7
common carp	51	0.8
flathead catfish	26	0.4
freshwater drum	102	1.6
gizzard shad	525	8.2
golden shiner	10	0.2
green sunfish	169	2.6
hybrid sunfish	7	0.1
largemouth bass	62	1.0
logperch	4	0.1
longear sunfish	1	0.02
longnose gar	8	0.1
northern plains killifish	1	0.02
orangespotted sunfish	23	0.4
orangethroat darter	5	0.1
quillback	7	0.1
red shiner	2953	46.2
river carpsucker	78	1.2
sand shiner	1	0.0
shortnose gar	8	0.1
smallmouth buffalo	19	0.3
suckermouth minnow	2	0.03
walleye	24	0.4
western mosquitofish	21	0.3
white bass	3	0.05
white crappie	163	2.6
white perch	1237	19.4
wiper (palmetto bass)	8	0.1
yellow bullhead	1	0.02
Total	**6385**	**100**

Index of Biotic Integrity = 102

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
fragile papershell	No	Yes	No
giant floater	No	Yes	No
pink papershell	No	Yes	No
white heelsplitter	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Acariformes		water mite	1
Amphipoda	Gammaridae	scud	37
Basomamatophora	Physidae	pouch snail	12
Coleoptera	Dytiscidae	predaceous diving beetle	12
Coleoptera	Elmidae	riffle beetle	4
Coleoptera	Haliplidae	crawling water beetle	2
Coleoptera	Hydrophilidae	water scavenger beetle	5
Diptera	Ceratopogonidae	bitting midge	3
Diptera	Chironomidae	midge	57
Ephemeroptera	Baetidae	small minnow mayfly	7
Ephemeroptera	Caenidae	small squaregills mayfly	47
Ephemeroptera	Isonychiidae	brushlegged mayfly	1
Heteroptera	Nepidae	water scorpion	1
Heteroptera	Pleidae	pygmy backswimmer	1
Odonata	Coenagrionidae	narrowwinged damselfly	9
Odonata	Macromiidae	belted skimmer dragonfly	1
Pharyngobdellida	Erpobdellidae	leech	1
Pulmonata	Ancylidae	ancylid snail	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	212
Trichoptera	Odontoceridae	strong case maker caddisfly	2
Veneroida	Corbiculiidae	Asian clam	4

Macroinvertebrate Biotic Index = 5.712

BIOLOGIST NOTE:

This is a very unique site for the North Fork Ninnescah River. The dam at the upper end of the site creates a fish concentration area below and throughout the site. The survey area had good habitat for many sport fish with submerged woody debris along the banks. It was incredible the amount of sport fish at this site. Our electrofishing efforts could not collect all the fish that were present in the survey reach. Every time a brush pile was re-electrofished, more and more fish were still there. The IBI value of 102 is very good but it is somewhat misleading with about 40% of fish numbers collected are introduced from Cheney Reservoir. The biggest influence is the white perch with 1,237 collected: 1,033 adults, 204 juveniles. This fish was first discovered in Cheney Reservoir in 1996. The MBI value of 5.712 is considered somewhat poor or impacted. This could be due to so many fish concentrated in one area with young of year fish feeding on aquatic insects. Good diversity of aquatic insects collected and nice to see high number of common netspinner caddisflies. Nice diversity of recent mussels shells collected at this site. These were common species for the lower North Fork Ninnescah River. Water chemistry values are normal for this river.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -42%	Fine/silt -2%
Fine Gravel -38%	Course Gravel - 9%
Boulder - 2%	Bedrock - 7%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	147	8	54
	Maximum	Minimum	Average
Right Bank -	35	5	16
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

42%	5%	26%
Maximum	Minimum	Average

Left side of stream - 43%
Right side of stream - 29%
Center of stream - 5%

BANK (INCISED) HEIGHT:

6.5	3.3	4.8
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 45%
Riffle - 23%
Pool - 32%

163-RFM-07

South Fork Ninnescah River

Kingman Co.

SE/4 of SW/4 SEC. 36, 27S, 9W

7/30/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	1.6 feet shallowest - 10 inches deepest - 2.8 feet		
Stream Width	155.4' Maximum	97.5' Minimum	122.4' Average
Stream Flow	68.160 CFS		

2007 WATER CHEMISTRY

	2007
pH	6.9
Alkalinity	176 mg/l
Conductivity	1419 microSiemens
Total Dissolved Solids	704 mg/l
Nitrates	2.2 mg/l
Phosphorus	0.17 mg/l
Chlorides	295 mg/l
Ammonia	0.06 mg/l
Dissolved Oxygen	7.2 mg/l
Turbidity	26 FTU
Salinity	0.7 %
Water Temperature	75 F
Air Temperature	77 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	1	0.04
bluegill	18	0.8
bluntnose minnow	12	0.5
brook silverside	13	0.6
bullhead minnow	200	8.9
central stoneroller	12	0.5
channel catfish	22	1.0
common carp	35	1.6
flathead catfish	5	0.2
freshwater drum	1	0.04
gizzard shad	1	0.04
green sunfish	110	4.9
largemouth bass	39	1.7
northern plains killifish	28	1.3
orangethroat darter	3	0.1
quillback	3	0.1
red shiner	1082	48.4
river carpsucker	17	0.8
sand shiner	591	26.4
suckermouth minnow	12	0.5
warmouth	3	0.1
western mosquitofish	28	1.3
yellow bullhead	1	0.04
Total	**2237**	**100**

Index of Biotic Integrity = 80

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
giant floater	No	Yes	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	1
Basomamatophora	Hydrobiidae	hydrobid snail	7
Basomamatophora	Physidae	pouch snail	3
Coleoptera	Elmidae	riffle beetle	13
Coleoptera	Hydrophilidae	water scavenger beetle	1
Decapoda	Cambridae	crayfish	1
Decapoda	Pasiphaeidae	glass shrimp	1
Diptera	Chironomidae	midge	19
Diptera	Simuliidae	black fly	1
Diptera	Tipulidae	crane fly	1
Ephemeroptera	Baetidae	small minnow mayfly	55
Ephemeroptera	Caenidae	small squaregills mayfly	59
Ephemeroptera	Heptageniidae	flatheaded mayfly	1
Ephemeroptera	Isonychiidae	brushlegged mayfly	7
Heteroptera	Veliidae	shortlegged strider	2
Odonata	Calopterygidae	broadwinged damselfly	28
Odonata	Coenagrionidae	narrowwinged damselfly	2
Odonata	Gomphidae	club-tailed dragonfly	7
Trichoptera	Hydropsychidae	common netspinner caddisfly	33
Trichoptera	Odontoceridae	strong case maker caddisfly	20
Veneroida	Corbiculiidae	Asian clam	2

Macroinvertebrate Biotic Index = 4.640

BIOLOGIST NOTE:
This survey was the upper control site of a weir stabilization project on the Byron Walker Wildlife Area, (east bridge) completed in December 2006, immediately downstream of this site.

The water chemistry values are normal for this river and this part of the state. IBI value of 80 is considered good with a nice diversity of fish species. The MBI value of 4.640 is very good especially for this part of the state and in a river this big. Low number of tolerant species and high number of mayflies and caddisflies help the MBI value be exceptional. This site will be surveyed again in 2008.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -93% Fine/silt -2%
Fine Gravel -5%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	124	34	65
	Maximum	Minimum	Average
Right Bank -	175	10	55
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

36%	4%	21%
Maximum	Minimum	Average

Left side of stream - 44%
Right side of stream - 19%
Center of stream - 0%

BANK (INCISED) HEIGHT:

4.9	2.9	3.7
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 66%
Pool - 34%

164-RFM-07

Pranther Creek

Chase Co.

NE/4 of NW/4 SEC. 30, 19S, 8E

7/31/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	10 inches shallowest - 2 inches deepest - 3.1 feet		
Stream Width	12.4' Maximum	3.3' Minimum	8.5' Average
Stream Flow	0.158 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.4
Alkalinity	193 mg/l
Conductivity	417 microSiemens
Total Dissolved Solids	201 mg/l
Nitrates	0.8 mg/l
Phosphorus	0.03 mg/l
Chlorides	11 mg/l
Ammonia	0.03 mg/l
Dissolved Oxygen	6.6 mg/l
Turbidity	7 FTU
Salinity	0.2 %
Water Temperature	72 F
Air Temperature	81 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	1	0.2
blackstripe topminnow	4	0.8
bluegill	25	4.9
bluntnose minnow	56	11.0
brook silverside	53	10.4
central stoneroller	134	26.3
channel catfish	2	0.4
creek chub	10	2.0
golden redhorse	8	1.6
green sunfish	12	2.4
largemouth bass	3	0.6
logperch	1	0.2
longear sunfish	26	5.1
orangespotted sunfish	44	8.6
orangethroat darter	105	20.6
slenderhead darter	3	0.6
spotted bass	10	2.0
spotted sucker	1	0.2
western mosquitofish	5	1.0
yellow bullhead	6	1.2
Total	**509**	**100**

Index of Biotic Integrity = 111

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
giant floater	No	No	Yes
pondmussel	No	Yes	Yes
pondhorn	No	Yes	No
white heelsplitter	No	No	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	6
Basomamatophora	Hydrobiidae	hydrobid snail	8
Basomamatophora	Physidae	pouch snail	3
Coleoptera	Dytiscidae	predaceous diving beetle	62
Coleoptera	Elmidae	riffle beetle	27
Decapoda	Cambridae	crayfish	2
Diptera	Chironomidae	midge	86
Diptera	Ephydridae	shore fly	1
Diptera	Simuliidae	black fly	2
Diptera	Tipulidae	crane fly	2
Ephemeroptera	Baetidae	small minnow mayfly	8
Ephemeroptera	Caenidae	small squaregills mayfly	30
Ephemeroptera	Heptageniidae	flatheaded mayfly	42
Ephemeroptera	Leptophlebiidae	pronggill mayfly	1
Heteroptera	Gerridae	water strider	1
Megaloptera	Sialidae	alderfly	17
Odonata	Aeshnidae	darner dragonfly	3
Odonata	Calopterygidae	broadwinged damselfly	9
Odonata	Coenagrionidae	narrowwinged damselfly	15
Pharyngobdellida	Erpobdellidae	leech	1
Plecoptera	Perlidae	common stonefly	1
Rhynchobdellida	Glossiphoniidae	leech	1
Trichoptera	Helicopsychidae	snailcase caddisfly	7
Trichoptera	Hydropsychidae	common netspinner caddisfly	23
Trichoptera	Limnephilidae	northern case maker caddisfly	6
Trichoptera	Polycentropodidae	tubemaking caddisfly	1
Veneroida	Corbiculiidae	Asian clam	2
Veneroida	Pisidiidae	fingernail clam	1

Macroinvertebrate Biotic Index = 6.132

BIOLOGIST NOTE:

This site was below Chase State Fishing Lake about 400 meters. The site was made up of favorable pool-riffle-glide sequence with a decent deeper pool at the lower end of the site. Therefore, there was an abundance of habitat for fish and aquatic insects. The IBI value of 111 is very good with a nice diversity of fish species. The fish community didn't seemed influenced too much by fish escaping from the lake. The MBI value of 6.132 is considered poor. With the great diversity of aquatic insects present and the diverse habitat present, I thought the MBI value would be much better. The water quality values are decent so the high numbers of midge insects is what caused the poor value. Good diversity of mussel species for this small of a stream, this high in the watershed from the Cottonwood River. This is a nice stream with tremendous diversity and stable banks and riparian area.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Course Gravel -51%	Fine/silt -5%
Fine Gravel -29%	Cobble - 11%
Bedrock - 2%	Wood - 2%

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	135	25	66
	Maximum	Minimum	Average
Right Bank -	89	5	36
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	34%	90%
Maximum	Minimum	Average

Left side of stream - 91%
Right side of stream - 90%
Center of stream - 91%

BANK (INCISED) HEIGHT:

5.5	1.3	2.3
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 53%
Riffle - 33%
Pool - 15%

165-RFM-07

South Fork Ninnescah River

Kingman Co.

SE/4 of SE/4 SEC. 34, 27S, 9W

8/1/07

2007 STREAM COMPARISONS

	2007
Length of Sample Site	984 feet
Average Stream Depth	2 feet shallowest - 8 inches deepest - 3.3 feet
Stream Width	169.0' Maximum 65.0' Minimum 102.1' Average
Stream Flow	78.690 CFS

2007 WATER CHEMISTRY

	2007
pH	8.2
Alkalinity	161 mg/l
Conductivity	1273 microSiemens
Total Dissolved Solids	629 mg/l
Nitrates	2 mg/l
Phosphorus	0.21 mg/l
Chlorides	242 mg/l
Ammonia	0.07 mg/l
Dissolved Oxygen	6.8 mg/l
Turbidity	26 FTU
Salinity	0.6 %
Water Temperature	79 F
Air Temperature	93 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	1	0.1
bluegill	10	0.9
bluntnose minnow	13	1.1
brook silverside	5	0.4
bullhead minnow	43	3.8
central stoneroller	2	0.2
channel catfish	14	1.2
common carp	5	0.4
flathead catfish	11	1.0
freshwater drum	1	0.1
green sunfish	58	5.1
largemouth bass	15	1.3
northern plains killifish	118	10.4
orangethroat darter	4	0.4
red shiner	432	38.1
river carpsucker	1	0.1
sand shiner	375	33.0
suckermouth minnow	7	0.6
western mosquitofish	18	1.6
white crappie	1	0.1
yellow bullhead	1	0.1
Total	**1135**	**100**

Index of Biotic Integrity = 82

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
pondmussel	No	No	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
Basomamatophora	Hydrobiidae	hydrobid snail	2
Coleoptera	Dytiscidae	predaceous diving beetle	3
Coleoptera	Elmidae	riffle beetle	16
Coleoptera	Hydrophilidae	water scavenger beetle	4
Diptera	Chironomidae	midge	14
Ephemeroptera	Baetidae	small minnow mayfly	20
Ephemeroptera	Caenidae	small squaregills mayfly	33
Ephemeroptera	Heptageniidae	flatheaded mayfly	3
Ephemeroptera	Isonychiidae	brushlegged mayfly	16
Ephemeroptera	Polymitarcyidae	pale burrower mayfly	1
Ephemeroptera	Tricorythidae	little stout crawler mayfly	17
Heteroptera	Veliidae	shortlegged strider	2
Odonata	Calopterygidae	broadwinged damselfly	11
Odonata	Gomphidae	club-tailed dragonfly	13
Ryncobdellida	Glossiphoniidae	leech	1
Trichoptera	Brachycentridae	humpless case maker caddisfly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	23
Trichoptera	Odontoceridae	strong case maker caddisfly	26
Veneroida	Corbiculidae	Asian clam	1

Macroinvertebrate Biotic Index = 4.502

BIOLOGIST NOTES:

This survey was the lower control site of a bank stabilization project on the Byron Walker Wildlife Area, (west bridge) completed in December 2006, immediately upstream of this site.

Water chemistry values are normal. The river was altered a little from a rain upstream in the watershed two days prior to the survey. The fish community had nice diversity and an IBI value of 82 is considered good, especially for a stream this wide. The MBI value of 4.502 is considered no environmental impacts. This is an excellent value for a stream this size and this far west in Kansas. Good number of mayflies and caddisflies helped support this value.

There will be four more surveys at this location over the next four consecutive summers.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -84% Fine/silt -9%
Fine Gravel -7%

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	168	12	93
	Maximum	Minimum	Average
Right Bank -	125	3	49
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

64%	13%	32%
Maximum	Minimum	Average

Left side of stream - 50%
Right side of stream - 38%
Center of stream - 7%

BANK (INCISED) HEIGHT:

4.2	2.6	3.2
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 36%
Pool - 64%

166-RFM-07

North Fork Ninnescah River

Sedgwick Co.

NW/4 of NW/4 SEC. 7, 27S, 4W

8/2/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	1.2 feet shallowest - 4 inches deepest - 3.9 feet		
Stream Width	92.3' Maximum	9.1' Minimum	50.8' Average
Stream Flow	2.054 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.7
Alkalinity	146 mg/l
Conductivity	778 microSiemens
Total Dissolved Solids	380 mg/l
Nitrates	0.4 mg/l
Phosphorus	0.11 mg/l
Chlorides	121 mg/l
Ammonia	0.08 mg/l
Dissolved Oxygen	4.7 mg/l
Turbidity	25 FTU
Salinity	0.3 %
Water Temperature	77 F
Air Temperature	77 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	9	0.3
bluegill	217	7.5
bluntnose minnow	64	2.2
central stoneroller	1	0.03
channel catfish	1	0.03
common carp	39	1.3
fathead minnow	2	0.1
flathead catfish	1	0.03
green sunfish	623	21.4
hybrid sunfish	3	0.1
largemouth bass	9	0.3
orangespotted sunfish	1	0.03
orangethroat darter	39	1.3
quillback	2	0.1
red shiner	134	4.6
redear sunfish	1	0.03
sand shiner	1	0.03
suckermouth minnow	5	0.2
walleye	36	1.2
western mosquitofish	114	3.9
white crappie	3	0.1
white perch	1585	54.6
wiper (palmetto bass)	5	0.2
yellow bullhead	10	0.3
Total	**2905**	**100**

Index of Biotic Integrity = 78

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	122
Basomamatophora	Ancylidae	limpet snail	1
Basomamatophora	Hydrobiidae	hydrobid snail	4
Basomamatophora	Physidae	pouch snail	22
Basomamatophora	Planorbidae	orb snail	4
Coleoptera	Hydrophilidae	water scavenger beetle	20
Diptera	Chironomidae	midge	49
Ephemeroptera	Baetidae	small minnow mayfly	19
Ephemeroptera	Caenidae	small squaregills mayfly	227
Ephemeroptera	Heptageniidae	flatheaded mayfly	2
Ephemeroptera	Isonychiidae	brushlegged mayfly	4
Ephemeroptera	Tricorythidae	little stout crawler mayfly	5
Heteroptera	Corixidae	water boatman	3
Lepidoptera	Pyralidae	aquatic pyralid moth	2
Megaloptera	Corydalidae	fishfly/dobsonfly	1
Odonata	Coenagrionidae	narrowwinged damselfly	6
Odonata	Gomphidae	club-tailed dragonfly	3
Odonata	Libellulidae	common skimmer dragonfly	1
Pharyngobdellida	Erpobdellidae	leech	7
Trichoptera	Helicopsychidae	snailcase caddisfly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	82
Trichoptera	Odontoceridae	strong case maker caddisfly	2
Trichoptera	Polycentropodidae	trumpetnet caddisfly	1
Veneroida	Corbiculidae	Asian clam	5
Veneroida	Pisidiidae	peaclam	2

Macroinvertebrate Biotic Index = 5.192

BIOLOGIST NOTES:

This site was below the dam at Cheney Reservoir about 600 meters. Water chemistry values are normal for this area of the state. Most of this site was made up of bedrock or eroded hard-pan substrate. Seventy percent of the fish community can be considered influenced from lake introductions. The most significant introduction was the collection of 1,585 white perch. The white perch were made up of 1,090 adults (>= 4 inches) and 495 juveniles. From personal observation, most of the adults collected were close to four inches in length. The IBI of 78 is considered good and this value should be considered fortunate with the high number of non-native fish collected. MBI value of 5.192 is considered moderate environmental impacts exist, although this is a decent score for this area of the state. Also, a high number of piscivores and low number of insectivores collected in the fish community may also have an impact on the decent value.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -5%
Course Gravel -29%
Fine Gravel -5%
Cobble - 24%
Bedrock - 36%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	89	14	39
	Maximum	Minimum	Average
Right Bank -	160	10	57
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

36%	0%	15%
Maximum	Minimum	Average

Left side of stream - 21%
Right side of stream - 21%
Center of stream - 3%

BANK (INCISED) HEIGHT:

2.0	1.0	1.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 62%
Riffle - 11%
Pool - 27%

167-RFM-07

Shoal Creek

Cherokee Co.

SW/4 of SE/4 SEC. 35, 34S, 25E

8/6/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	4 feet shallowest - 1.3 feet deepest - 7.2 feet		
Stream Width	149.5' Maximum	84.8' Minimum	120.2' Average
Stream Flow	140.090 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.6
Alkalinity	147 mg/l
Conductivity	394 microSiemens
Total Dissolved Solids	189.8 mg/l
Nitrates	3.2 mg/l
Phosphorus	0.22 mg/l
Chlorides	20 mg/l
Ammonia	0.07 mg/l
Dissolved Oxygen	6 mg/l
Turbidity	6 FTU
Salinity	0.1 %
Water Temperature	79 F
Air Temperature	97 F

FISH POPULATION COMPARISONS

	2007				
SPECIES	#	% BY #	SPECIES	#	% BY #
banded darter	10	0.3	longnose gar	1	0.03
banded sculpin	4	0.1	mimic shiner	45	1.5
bigeye shiner	11	0.4	northern hogsucker	5	0.2
black buffalo	4	0.1	orangespotted sunfish	2	0.1
black crappie	1	0.03	orangethroat darter	56	1.8
blackstripe topminnow	11	0.4	pealip redhorse	3	0.1
bluegill	286	9.2	redear sunfish	5	0.2
bluntface shiner	2	0.1	redspot chub	1	0.03
bluntnose minnow	123	4.0	river redhorse	13	0.4
brook silverside	15	0.5	rock bass	11	0.4
cardinal shiner	435	14.0	slender madtom	2	0.1
carmine shiner	31	1.0	smallmouth bass	7	0.2
central stoneroller	1429	46.1	smallmouth buffalo	6	0.2
channel catfish	25	0.8	speckled darter	9	0.3
channel darter	1	0.03	spotfin shiner	82	2.6
fantail darter	1	0.03	spotted bass	9	0.3
gizzard shad	54	1.7	spotted sucker	2	0.1
golden redhorse	37	1.2	walleye	1	0.03
green sunfish	10	0.3	warmouth	42	1.4
greenside darter	4	0.1	western mosquitofish	33	1.1
largemouth bass	24	0.8	white crappie	1	0.03
logperch	93	3.0	yellow bullhead	1	0.03
longear sunfish	149	4.8	**TOTAL**	**3097**	**100**

Index of Biotic Integrity = 100

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
		aquatic earthworm	2
Basomamatophora	Hydrobiidae	hydrobid snail	2
Coleoptera	Elmidae	riffle beetle	80
Collembola	Isotomidae	isotomid springtail	3
Decapoda	Cambaridae	crayfish	3
Diptera	Chironomidae	midge	22
Diptera	Simuliidae	black fly	11
Ephemeroptera	Baetidae	small minnow mayfly	1
Ephemeroptera	Caenidae	small squaregills mayfly	8
Ephemeroptera	Ephemeridae	common burrower mayfly	2
Ephemeroptera	Heptageniidae	flatheaded mayfly	12
Ephemeroptera	Siphlonuridae	primitive minnow mayfly	4
Ephemeroptera	Tricorythidae	little stout crawler mayfly	9
Heteroptera	Gerridae	water strider	14
Heteroptera	Veliidae	shortlegged strider	2
Hydracarina	Arrenuroidae	water mite	3
Mesogastropoda	Pleuroceridae	river snail	44
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Calopterygidae	broadwinged damselfly	2
Odonata	Coenagrionidae	narrowwinged damselfly	21
Odonata	Gomphidae	club-tailed dragonfly	3
Trichoptera	Hydropsychidae	common netspinner caddisfly	65
Trichoptera	Odontoceridae	strong case maker caddisfly	3
Tricladida	Planariidae	flatworm	4
Veneroida	Pisidiidae	peaclam	5

Macroinvertebrate Biotic Index = 5.005

BIOLOGIST NOTES:

This site was located on the east (most upstream) end of Shoal Creek Wildlife area. Water chemistry values seem to be normal, although the nitrate levels may be elevated for this time of year. As usual, the fish community was outstanding with 3,097 individuals making up 44 species of fish collected. One state endangered species was collected, the redspot chub. Six species in need of conservation were also collected. An IBI value of 100 is excellent. The MBI value fo 5.005 is considered moderate although this value is good for a stream this size. The site had a variety of habitats and refuge areas which support the high diversity of aquatic life.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -4%	Fine/silt -15%
Fine Gravel -5%	Course Gravel - 45%
Cobble - 24%	Boulder - 7%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	70	3	28
	Maximum	Minimum	Average
Right Bank -	57	8	21
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

54%	24%	37%
Maximum	Minimum	Average

Left side of stream - 46%
Right side of stream - 59%
Center of stream - 6%

BANK (INCISED) HEIGHT:

4.2	2.3	3.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 8%
Riffle - 6%
Pool - 75%
Rapid - 11%

168-RFM-07

Trib. Shoal Creek

Cherokee Co.

SE/4 of SE/4 SEC. 36, 34S, 25E

8/7/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	4 inches shallowest - 0 inches deepest - 1.1 feet		
Stream Width	13.3' Maximum	2.0' Minimum	7.3' Average
Stream Flow	0.074 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.3
Alkalinity	171 mg/l
Conductivity	391 microSiemens
Total Dissolved Solids	188.6 mg/l
Nitrates	1.3 mg/l
Phosphorus	0.01 mg/l
Chlorides	22 mg/l
Ammonia	0.02 mg/l
Dissolved Oxygen	5.7 mg/l
Turbidity	0 FTU
Salinity	0.2 %
Water Temperature	73 F
Air Temperature	79 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	1	0.2
banded sculpin	2	0.3
cardinal shiner	56	8.5
central stoneroller	147	22.4
creek chub	80	12.2
fantail darter	64	9.8
green sunfish	1	0.2
orangethroat darter	66	10.1
southern redbelly dace	133	20.3
stippled darter	48	7.3
western mosquitofish	57	8.7
white sucker	1	0.2
Total	**656**	**100**

Index of Biotic Integrity = 107

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	4
Coleoptera	Elmidae	riffle beetle	3
Coleoptera	Helodidae	marsh beetle	1
Coleoptera	Psephenidae	water penny	50
Decapoda	Cambaridae	crayfish	11
Diptera	Chironomidae	midge	18
Diptera	Tipulidae	crane fly	5
Ephemeroptera	Baetidae	small minnow mayfly	8
Ephemeroptera	Heptageniidae	flatheaded mayfly	16
Heteroptera	Gerridae	water strider	1
Heteroptera	Veliidae	shortlegged strider	6
Isopoda	Asellidae	aquatic sowbug	76
Megaloptera	Corydalidae	fishfly/dobsonfly	2
Megaloptera	Sialidae	alderfly	1
Mesogastropoda	Pleuroceridae	river snail	2
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Gomphidae	club-tailed dragonfly	14
Odonata	Libellulidae	common skimmer dragonfly	1
Plecoptera	Leuctridae	rolledwinged stonefly	28
Plecoptera	Perlidae	common stonefly	19
Trichoptera	Hydropsychidae	common netspinner caddisfly	2
Trichoptera	Polycentropodidae	trumpetnet caddisfly	6
Tricladida	Planariidae	flatworm	6

Macroinvertebrate Biotic Index = 5.073

BIOLOGIST NOTES:

This is one of the most peerless streams I have seen in Kansas. It would be Kansas' version of an Ozark stream; also considered the farthest southeastern stream in Kansas. It's a second order tributary to Shoal Creek that has a watershed of about 1.6 valley miles, only a few hundred meters of this stream contain water. Water chemistry values are decent with a turbidity value of 0 being exceptional. The clarity of distilled water is used as a control to set the turbidity instrument to 0 when measuring the clarity of stream water. This means that the water from this stream was as clear as distilled water. The water was so clear, without light refraction, it just looked like wet rocks when taking a picture. The survey site was 150 meters long stretching from the only road crossing of this stream to the confluence with Shoal Creek. The IBI value of 107 is considered excellent. The Arkansas darter, a threatened fish is Kansas, was collected from a backwater pool along this site. This fish is mostly common in sandy spring fed streams of south-central Kansas, although, most records in this area are from the Spring River in Cherokee county. Forty-eight stippled darters, considered a species in need of conservation in Kansas, were also collected at this site. The southern redbelly dace was a pleasant surprise for this is the only place in Cherokee county KDWP has collected this species. The southern redbelly dace primary range in Kansas is the northern flint hills region. MBI value of 5.073 is considered good. A considerable number of stoneflies, an intolerant species, were collected at this site. This site is the first and only site a rolledwinged stonefly has been collected by KDWP. I see the significance of this stream to be possibly one of the only representations of a small Ozark stream for Kansas.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Course gravel -55%
Fine Gravel -27%
Bedrock - 4%
Fine/silt -7%
Cobble - 7%

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	90	4	24
	Maximum	Minimum	Average
Right Bank -	26	4	12
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	67%	95%
Maximum	Minimum	Average

Left side of stream - 98%
Right side of stream - 92%
Center of stream - 95%

BANK (INCISED) HEIGHT:

1.6	1.0	1.4
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 40%
Riffle - 37%
Pool - 20%
Dry - 3%

169-RFM-07

Shoal Creek

Cherokee Co.

NW/4 of NE/4 SEC. 34, 34S, 25E

8/8/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	4.1 feet shallowest - 4 inches deepest - 8.8 feet		
Stream Width	145.0' Maximum	43.6' Minimum	91.6' Average
Stream Flow	127.260 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.6
Alkalinity	146 mg/l
Conductivity	438 microSiemens
Total Dissolved Solids	208 mg/l
Nitrates	3.6 mg/l
Phosphorus	0.31 mg/l
Chlorides	34 mg/l
Ammonia	0.09 mg/l
Dissolved Oxygen	5.2 mg/l
Turbidity	5 FTU
Salinity	0.2 %
Water Temperature	79 F
Air Temperature	81 F

FISH POPULATION COMPARISONS

	2007				
SPECIES	#	% BY #	SPECIES	#	% BY #
banded darter*	125	4.7	largemouth bass	16	0.6
banded sculpin*	8	0.3	logperch	203	7.6
bigeye shiner	39	1.5	longear sunfish	175	6.6
black buffalo	4	0.2	mimic shiner	136	5.1
blackstripe topminnow	5	0.2	northern hogsucker*	36	1.4
bluegill	99	3.7	orangespotted sunfish	8	0.3
bluegill X green sunfish hybrid	3	0.1	orangethroat darter	132	5.0
bluegill X longear sunfish hybrid	2	0.1	Ozark minnow*	24	0.9
bluntface shiner	15	0.6	pealip redhorse	2	0.1
bluntnose minnow	44	1.7	river redhorse*	2	0.1
brook silverside	23	0.9	rock bass	11	0.4
cardinal shiner	238	8.9	smallmouth bass	2	0.1
carmine shiner	121	4.5	speckled darter*	9	0.3
central stoneroller	852	32.0	spotfin shiner*	46	1.7
channel catfish	7	0.3	spotted bass	17	0.6
channel darter	55	2.1	spotted sucker*	8	0.3
gizzard shad	12	0.5	stonecat	6	0.2
golden redhorse	27	1.0	suckermouth minnow	9	0.3
gravel chub*	12	0.5	warmouth	15	0.6
green sunfish	17	0.6	western mosquitofish	35	1.3
greenside darter*	65	2.4	yellow bullhead	1	0.04
			Total	**2666**	**100**

Index of Biotic Integrity = 104

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	No	Yes	No
plain pocketbook	No	Yes	Yes
pondmussel	No	No	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
		aquatic earthworm	8
Basomamatophora	Ancylidae	limpet snail	7
Basomamatophora	Physidae	pouch snail	7
Coleoptera	Elmidae	riffle beetle	49
Coleoptera	Helodidae	marsh beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	7
Coleoptera	Psephenidae	water penny	1
Collembola	Isotomidae	isotomid springtail	27
Decapoda	Cambaridae	crayfish	5
Diptera	Chironomidae	midge	36
Diptera	Simuliidae	black fly	4
Ephemeroptera	Baetidae	small minnow mayfly	4
Ephemeroptera	Caenidae	small squaregills mayfly	16
Ephemeroptera	Ephemeridae	common burrower mayfly	1
Ephemeroptera	Heptageniidae	flatheaded mayfly	8
Ephemeroptera	Tricorythidae	little stout crawler mayfly	16
Heteroptera	Belostomatidae	giant water bug	1
Heteroptera	Gerridae	water strider	1
Heteroptera	Veliidae	shortlegged strider	12
Megaloptera	Corydalidae	fishfly/dobsonfly	1
Mesogastropoda	Pleuroceridae	river snail	7
Odonata	Calopterygidae	broadwinged damselfly	5
Odonata	Coenagrionidae	narrowwinged damselfly	12
Odonata	Gomphidae	club-tailed dragonfly	1
Pharyngobdellida	Erpobdellidae	leech	1
Trichoptera	Glossosomatidae	saddlecase maker caddisfly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	57
Tricladida	Planariidae	flatworm	10
Trombidiformes	Arrenuroidae	water mite	10
Veneroida	Corbiculidae	Asian clam	6

Macroinvertebrate Biotic Index = 5.536

BIOLOGIST NOTES: This was a large site with numerous amounts of diverse aquatic habitat to sample. Only about 70% of this site was considered wadeable according to the protocols. I believe we still had a good representation from collected data, even with the deep water. Nothing out of the ordinary in the water chemistry values. IBI value of 104 is excellent with 2,666 individuals collected from 42 fish species. Ten species (*) collected are considered species in need of conservation by KDWP. Most of these 10 species are also peripheral species (outside margin of their native range is southeast Kansas). The MBI value of 5.536 is considered average to good. Like the fish community, there was a lot of diversity of habitat for macroinvertebrates. Good variety of species collected with about 30 different families.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -2%	Fine/silt -13%
Fine Gravel -25%	Course Gravel - 47%
Cobble - 4%	Boulder - 4%
Bedrock - 2%	Wood - 4%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	80	10	46
	Maximum	Minimum	Average
Right Bank -	81	4	22
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

48%	0%	29%
Maximum	Minimum	Average

Left side of stream - 51%
Right side of stream - 30%
Center of stream - 5%

BANK (INCISED) HEIGHT:

4.2	2.0	3.1
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 2%
Riffle - 13%
Pool - 85%

170-RFM-07

Spring Branch Creek

Cherokee Co.

NE/4 of NE/4 SEC. 13, 34S, 25E

8/9/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	10 inches shallowest - 2 inches deepest - 2.7 feet		
Stream Width	25.4' Maximum	6.5' Minimum	13.3' Average
Stream Flow	0.154 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.1
Alkalinity	154 mg/l
Conductivity	359 microSiemens
Total Dissolved Solids	173.1 mg/l
Nitrates	2.2 mg/l
Phosphorus	0.3 mg/l
Chlorides	14 mg/l
Ammonia	0.06 mg/l
Dissolved Oxygen	4.7 mg/l
Turbidity	2 FTU
Salinity	0.1 %
Water Temperature	75 F
Air Temperature	81 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bluegill	12	1.0
central stoneroller	799	69.5
creek chub	230	20.0
green sunfish	29	2.5
green sunfish X warmouth hybrid	1	0.1
largemouth bass	13	1.1
warmouth	2	0.2
western mosquitofish	63	5.5
Total	**1149**	**100**

Index of Biotic Integrity = 70

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
		aquatic earthworm	2
Basomamatophora	Physidae	pouch snail	2
Coleoptera	Dytiscidae	predaceous diving beetle	2
Coleoptera	Elmidae	riffle beetle	3
Coleoptera	Helodidae	marsh beetle	2
Coleoptera	Hydrophilidae	water scavenger beetle	5
Coleoptera	Psephenidae	water penny	42
Decapoda	Cambaridae	crayfish	6
Diptera	Chironomidae	midge	21
Diptera	Psychodidae	moth fly	1
Diptera	Simuliidae	black fly	5
Diptera	Tabanidae	deer/horse fly	4
Diptera	Tipulidae	crane fly	1
Ephemeroptera	Baetidae	small minnow mayfly	93
Ephemeroptera	Caenidae	small squaregills mayfly	36
Ephemeroptera	Heptageniidae	flatheaded mayfly	83
Heteroptera	Veliidae	shortlegged strider	7
Isopoda	Asellidae	aquatic sowbug	1
Megaloptera	Sialidae	alderfly	2
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Calopterygidae	broadwinged damselfly	5
Odonata	Coenagrionidae	narrowwinged damselfly	38
Odonata	Gomphidae	club-tailed dragonfly	1
Odonata	Libellulidae	common skimmer dragonfly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	6
Trichoptera	Polycentropodidae	trumpetnet caddisfly	8
Veneroida	Pisidiidae	peaclam	1

Macroinvertebrate Biotic Index = 4.727

BIOLOGIST NOTES:

The water chemistry values are adequate although the nitrate levels may be somewhat elevated for this time of year. One reason could be the upper part of this watershed flows through a residential area in Missouri and there may be some influence from fertilizers from lawns. The IBI value of 70 is considered good but I thought this size of stream in this area of the state might have a better IBI. The site is dominated by predator species. The high number of central stonerollers could be from the elevated nitrates, rocky substrate and clear water then add sunlight, make a good combination for algae growth, hence the high number of central stonerollers collected. Algae is the main diet of the central stoneroller. The MBI value of 4.727 is considered good. There was a large diversity of aquatic insects collected with a high number of mayfly species being the most abundant. It may be interesting to compare this stream to an adjacent stream called Short Creek that is a little larger.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Course Gravel -45%	Fine/silt -9%
Fine Gravel -18%	Cobble - 22%
Boulder - 4%	Other - 1%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	102	5	22
	Maximum	Minimum	Average
Right Bank -	90	12	41
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

92%	1%	51%
Maximum	Minimum	Average

Left side of stream - 47%
Right side of stream - 51%
Center of stream - 57%

BANK (INCISED) HEIGHT:

4.9	1.0	2.5
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 54%
Riffle - 19%
Pool - 27%

171-RFM-07

South Fork Cottonwood River

Chase Co.

SE/4 of SE/4 SEC. 29, 22S, 8E

8/13/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	820 feet		
Average Stream Depth	1.9 feet shallowest - 4 inches deepest - 7.5 feet		
Stream Width	66.0' Maximum	16.3' Minimum	31.4' Average
Stream Flow	2.439 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.6
Alkalinity	185 mg/l
Conductivity	453 microSiemens
Total Dissolved Solids	219 mg/l
Nitrates	1.8 mg/l
Phosphorus	0.06 mg/l
Chlorides	10 mg/l
Ammonia	0.01 mg/l
Dissolved Oxygen	4.7 mg/l
Turbidity	7 FTU
Salinity	0.2 %
Water Temperature	77 F
Air Temperature	82 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bigmouth buffalo	6	0.4
blackstripe topminnow	5	0.3
bluegill	58	3.5
bluntface shiner	10	0.6
bluntnose minnow	134	8.1
cardinal shiner	136	8.2
carmine shiner	187	11.3
central stoneroller	282	17.0
channel catfish	7	0.4
common carp	3	0.2
fantail darter	103	6.2
flathead catfish	4	0.2
freckled madtom	1	0.1
golden redhorse	6	0.4
green sunfish	47	2.8
largemouth bass	19	1.1
logperch	5	0.3
longear sunfish	13	0.8
longnose gar	5	0.3
mimic shiner	203	12.3
orangespotted sunfish	13	0.8
orangethroat darter	227	13.7
pealip redhorse	4	0.2
red shiner	60	3.6
redfin shiner	28	1.7
river carpsucker	1	0.1
slenderhead darter	2	0.1
slim minnow	30	1.8
smallmouth buffalo	9	0.5
spotted bass	13	0.8
stonecat	28	1.7
western mosquitofish	6	0.4
white crappie	1	0.1
Total	**1656**	**100**

Index of Biotic Integrity = 107

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
creeper	No	Yes	Yes
giant floater	No	Yes	No
plain pocketbook	No	Yes	No
pondmussel	No	Yes	Yes
yellow sandshell	No	No	Yes

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	11
Basomamatophora	Hydrobiidae	hydrobid snail	3
Basomamatophora	Physidae	pouch snail	9
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Curculionidae	water weevil	1
Coleoptera	Dytiscidae	predaceous diving beetle	16
Coleoptera	Elmidae	riffle beetle	135
Coleoptera	Helodidae	marsh beetle	8
Coleoptera	Hydrophilidae	water scavenger beetle	3
Decapoda	Cambaridae	crayfish	1
Diptera	Ceratopogonidae	biting midge	1
Diptera	Chironomidae	midge	20
Diptera	Empididae	aquatic dance fly	2
Diptera	Simuliidae	black fly	10
Diptera	Tabanidae	deer/horse fly	3
Diptera	Tipulidae	crane fly	24
Ephemeroptera	Baetidae	small minnow mayfly	18
Ephemeroptera	Caenidae	small squaregills mayfly	45
Ephemeroptera	Heptageniidae	flatheaded mayfly	29
Ephemeroptera	Isonychiidae	brushlegged mayfly	8
Ephemeroptera	Leptophlebiidae	pronggill mayfly	26
Ephemeroptera	Tricorythidae	little stout crawler mayfly	8
Heteroptera	Gerridae	water strider	1
Heteroptera	Mesoveliidae	water treader	1
Heteroptera	Naucoridae	creeping water bug	1
Megaloptera	Corydalidae	fishfly/dobsonfly	2
Nematophora	Gordiidae	horsehair worm	1
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Coenagrionidae	narrowwinged damselfly	10
Odonata	Libellulidae	common skimmer dragonfly	1
Pharyngobdellida	Erpobdellidae	leech	3
Rhyncobdellida	Glossiphoniidae	leech	2
Trichoptera	Hydropsychidae	common netspinner caddisfly	113
Trichoptera	Philopotamidae	fingernet caddisfly	5
Tricladida	Planariidae	flatworm	1
Veneroida	Pisidiidae	peaclam	14

Macroinvertebrate Biotic Index = 4.532

BIOLOGIST NOTES:
This is one of the most aquatic diverse surveys we conducted in 2007. There was a variety of habitats for fish, aquatic insects, and mussels available in this stream. The water chemistry values are normal for this part of the state. The fish community is very diverse with 33 different species of fish collected. An IBI value of 107 is excellent. There was a adequate mussel community collected with many of the mussel species being recently dead specimens. The macroinvertebrate community had a MBI value of 4.532 which is considered good. Thirty-six different families of aquatic insects is the result of decent water quality and a variety of habitats (pools, riffles, glides, rocks, woody debris, vegetation) for aquatic insects to live in.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Course Gravel -51%	Fine/silt -16%
Fine Gravel -20%	Cobble - 7%
Boulder - 5%	

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	115	3	40
	Maximum	Minimum	Average
Right Bank -	40	4	20
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	8%	64%
Maximum	Minimum	Average

Left side of stream - 82%
Right side of stream - 47%
Center of stream - 63%

BANK (INCISED) HEIGHT:

4.6	2.6	3.6
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 19%
Riffle - 37%
Pool - 44%

172-RFM-07

West Trib South Fork Cottonwood River

Chase Co.

SW/4 of NE/4 SEC. 32, 22S, 8E

8/14/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	591 feet		
Average Stream Depth	1.4 feet shallowest - 1 inch deepest - 3.9 feet		
Stream Width	26.7' Maximum	8.1' Minimum	17.0' Average
Stream Flow	0.106 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.6
Alkalinity	272 mg/l
Conductivity	559 microSiemens
Total Dissolved Solids	271 mg/l
Nitrates	1.3 mg/l
Phosphorus	0.08 mg/l
Chlorides	8 mg/l
Ammonia	0.02 mg/l
Dissolved Oxygen	5.6 mg/l
Turbidity	2 FTU
Salinity	0.2 %
Water Temperature	73 F
Air Temperature	77 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black crappie	1	0.2
bluegill	3	0.6
bluntface shiner	15	2.8
bluntnose minnow	4	0.7
cardinal shiner	45	8.3
central stoneroller	290	53.4
green sunfish	13	2.4
largemouth bass	46	8.5
longear sunfish	2	0.4
orangespotted sunfish	1	0.2
orangethroat darter	31	5.7
red shiner	47	8.7
redfin shiner	22	4.1
slim minnow	1	0.2
western mosquitofish	3	0.6
white crappie	3	0.6
yellow bullhead	16	2.9
Total	**543**	**100**

Index of Biotic Integrity = 96

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	33
Basomamatophora	Hydrobiidae	hydrobid snail	2
Basomamatophora	Physidae	pouch snail	4
Coleoptera	Dytiscidae	predaceous diving beetle	9
Coleoptera	Elmidae	riffle beetle	38
Coleoptera	Gyrinidae	whirligig beetle	3
Coleoptera	Hydrophilidae	water scavenger beetle	4
Diptera	Chironomidae	midge	19
Diptera	Culicidae	mosquito	1
Diptera	Tabanidae	deer/horse fly	4
Diptera	Tipulidae	crane fly	4
Ephemeroptera	Baetidae	small minnow mayfly	19
Ephemeroptera	Caenidae	small squaregills mayfly	111
Ephemeroptera	Heptageniidae	flatheaded mayfly	79
Ephemeroptera	Leptophlebiidae	pronggill mayfly	16
Heteroptera	Gerridae	water strider	1
Heteroptera	Mesoveliidae	water treader	1
Heteroptera	Veliidae	shortlegged strider	3
Lepidoptera	Pyralidae	snout moth	2
Nematophora	Gordiidae	horsehair worm	1
Odonata	Coenagrionidae	narrowwinged damselfly	7
Odonata	Libellulidae	common skimmer dragonfly	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	2

Macroinvertebrate Biotic Index = 4.529

BIOLOGIST NOTES:

This was a nice stream with large rock riffles, areas of bedrock, and some deeper pools on the bends of the creek and a couple deeper longitudinal pools within the site. Water chemistry values were normal for this area of the state. The IBI value of 96 is very good. The central stoneroller was the most abundant due to all the rocky substrate present. MBI value of 4.529 is considered good. Mayfly species were the most dominant of the aquatic insect community.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Course Gravel -36%	Fine/silt -11%
Fine Gravel -11%	Cobble - 27%
Boulder - 4%	Bedrock - 11%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	105	5	36
	Maximum	Minimum	Average
Right Bank -	100	4	41
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

98%	10%	59%
Maximum	Minimum	Average

Left side of stream - 71%
Right side of stream - 57%
Center of stream - 50%

BANK (INCISED) HEIGHT:

2.9	1.3	2.0
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 49%
Riffle - 20%
Pool - 31%

173-RFM-07

Cedar Creek

Chase Co.

SE/4 of NW/4 SEC. 24, 21S, 5E

8/15/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	2.1 feet shallowest - 7 inches deepest - 9.1 feet		
Stream Width	79.6' Maximum	22.4' Minimum	46.8' Average
Stream Flow	13.121 CFS		

2007 WATER CHEMISTRY

	2007
pH	8.0
Alkalinity	285 mg/l
Conductivity	581 microSiemens
Total Dissolved Solids	282 mg/l
Nitrates	0.2 mg/l
Phosphorus	0.06 mg/l
Chlorides	34 mg/l
Ammonia	0.05 mg/l
Dissolved Oxygen	7.4 mg/l
Turbidity	19 FTU
Salinity	0.2 %
Water Temperature	79 F
Air Temperature	81 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
blackstripe topminnow	9	0.5
bluegill	24	1.3
bluntface shiner	9	0.5
bluntnose minnow	200	10.5
brook silverside	145	7.6
cardinal shiner	220	11.5
central stoneroller	95	5.0
channel catfish	17	0.9
channel darter	2	0.1
creek chub	1	0.1
fantail darter	61	3.2
flathead catfish	9	0.5
freckled madtom	1	0.1
freshwater drum	2	0.1
gizzard shad	2	0.1
golden redhorse	10	0.5
green sunfish	81	4.2
largemouth bass	5	0.3
logperch	4	0.2
longear sunfish	30	1.6
longnose gar	2	0.1
mimic shiner	68	3.6
orangespotted sunfish	31	1.6
orangethroat darter	136	7.1
pealip redhorse	11	0.6
red shiner	291	15.3
redfin shiner	35	1.8
river carpsucker	1	0.1
slenderhead darter	39	2.0
slim minnow	37	1.9
smallmouth buffalo	1	0.1
spotted bass	20	1.0
stonecat	30	1.6
suckermouth minnow	274	14.4
white crappie	1	0.1
yellow bullhead	3	0.2
Total	**1907**	**100**

Index of Biotic Integrity = 105

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
bleufer	No	Yes	Yes
creeper*	No	Yes	No
fragile papershell	Yes	Yes	No
giant floater	No	No	Yes
pimpleback	No	No	Yes
pink papershell	No	Yes	Yes
pistolgrip	No	Yes	No
plain pocketbook	No	Yes	Yes
pondmussel	No	Yes	Yes
spike*	No	Yes	Yes
threeridge	No	Yes	Yes
Wabash pigtoe*	No	No	Yes
white heelsplitter	No	Yes	Yes
yellow sandshell*	No	No	Yes

BIOLOGIST NOTE:
This was the most diverse site we surveyed in the summer of 2007. There was an amazing variety in the fish, mussel, and aquatic insect communities. Numerous diversity of habitat for all aquatic life existed at this site. The IBI value of 105 is excellent. The fish community was very diverse with 36 species collected. The totebarge electrofishing unit we were using to collect the fish quit about 75 meters into our 300 meter site and we had to use a backpack shocker for the rest. I was concerned about our fish sampling ability but I feel we had very good results according to the collected fish data. A good diversity of mussels were collected with many of them being recently dead specimens. Four of the specimens (*) are considered species in need of conservation by KDWP, meaning their numbers aren't to the level of being threatened or endangered. The MBI value of 4.628 is considered good. Thirty-six different families of aquatic insects collected is a good example of decent water quality and a variety of habitat for them to live in.

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	6
Basomamatophora	Hydrobiidae	hydrobid snail	6
Basomamatophora	Physidae	pouch snail	4
Coleoptera	Dryopidae	longtoad water beetle	4
Coleoptera	Dytiscidae	predaceous diving beetle	2
Coleoptera	Elmidae	riffle beetle	121
Coleoptera	Gyrinidae	whirligig beetle	12
Coleoptera	Helodidae	marsh beetle	6
Coleoptera	Hydrophilidae	water scavenger beetle	1
Decapoda	Cambaridae	crayfish	1
Diptera	Chironomidae	midge	42
Diptera	Simuliidae	black fly	4
Diptera	Stratiomyidae	aquatic soldier fly	1
Ephemeroptera	Baetidae	small minnow mayfly	57
Ephemeroptera	Caenidae	small squaregills mayfly	18
Ephemeroptera	Heptageniidae	flatheaded mayfly	24
Ephemeroptera	Isonychiidae	brushlegged mayfly	17
Ephemeroptera	Leptophlebiidae	pronggill mayfly	28
Ephemeroptera	Tricorythidae	little stout crawler mayfly	25
Heteroptera	Mesoveliidae	water treader	1
Heteroptera	Pleidae	pygmy backswimmer	1
Heteroptera	Veliidae	shortlegged strider	8
Megaloptera	Corydalidae	fishfly/dobsonfly	2
Odonata	Aeshnidae	darner dragonfly	1
Odonata	Calopterygidae	broadwinged damselfly	3
Odonata	Coenagrionidae	narrowwinged damselfly	9
Odonata	Gomphidae	club-tailed dragonfly	1
Odonata	Libellulidae	common skimmer dragonfly	1
Trichoptera	Helicopsychidae	snailcase caddisfly	15
Trichoptera	Hydropsychidae	common netspinner caddisfly	51
Trichoptera	Hydroptilidae	micro caddisfly	1
Trichoptera	Leptoceridae	longhorned caddisfly	4
Trichoptera	Philopotamidae	fingernet caddisfly	7
Tricladida	Planariidae	flatworm	2
Veneroida	Corbiculidae	Asian clam	3
Veneroida	Pisidiidae	peaclam	45

Macroinvertebrate Biotic Integrity = 4.628

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Course Gravel -20%	Fine/silt -15%
Fine Gravel -7%	Cobble - 24%
Boulder - 5%	Bedrock - 27%
Wood - 2%	

BANK ANGLE (in degrees): (Looking Downstream)
number greater that 90 is an undercut bank

Left Bank -	123	6	40
	Maximum	Minimum	Average
Right Bank -	62	7	28
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

100%	25%	58%
Maximum	Minimum	Average

Left side of stream - 51%
Right side of stream - 77%
Center of stream - 47%

BANK (INCISED) HEIGHT:

4.2	2.0	3.0
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 31%
Riffle - 22%
Pool - 35%
Rapid - 7%
Cascade - 5%

174-RFM-07

Southwest Trib South Fork Cottonwood River

Butler Co.

NW/4 of SE/4 SEC. 5, 23S, 8E

8/16/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	492 feet		
Average Stream Depth	1 foot shallowest - 0 inches deepest - 3.5 feet		
Stream Width	28.3' Maximum	4.2' Minimum	11.8' Average
Stream Flow	0.113 CFS		

2007 WATER CHEMISTRY

	2007
pH	7.4
Alkalinity	286 mg/l
Conductivity	545 microSiemens
Total Dissolved Solids	264 mg/l
Nitrates	1.2 mg/l
Phosphorus	0.03 mg/l
Chlorides	13 mg/l
Ammonia	0.02 mg/l
Dissolved Oxygen	3.9 mg/l
Turbidity	1 FTU
Salinity	0.2 %
Water Temperature	75 F
Air Temperature	100 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black bullhead	6	3.0
blackstripe topminnow	3	1.5
bluegill	6	3.0
bluegill X green sunfish hybrid	1	0.5
bluntnose minnow	1	0.5
cardinal shiner	2	1.0
central stoneroller	17	8.6
creek chub	4	2.0
green sunfish	32	16.2
largemouth bass	7	3.6
orangethroat darter	18	9.1
redfin shiner	77	39.1
yellow bullhead	23	11.7
Total	**197**	**100**

Index of Biotic Integrity = 98

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	3
Basomamatophora	Physidae	pouch snail	15
Basomamatophora	Planorbidae	orb snail	4
Coleoptera	Dytiscidae	predaceous diving beetle	8
Coleoptera	Elmidae	riffle beetle	8
Coleoptera	Gyrinidae	whirligig beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	12
Decapoda	Cambaridae	crayfish	2
Diptera	Ceratopogonidae	biting midge	2
Diptera	Chironomidae	midge	9
Diptera	Tipulidae	crane fly	2
Ephemeroptera	Baetidae	small minnow mayfly	19
Ephemeroptera	Caenidae	small squaregills mayfly	28
Ephemeroptera	Heptageniidae	flatheaded mayfly	187
Ephemeroptera	Leptophlebiidae	pronggill mayfly	51
Heteroptera	Gerridae	water strider	1
Heteroptera	Nepidae	water scorpion	1
Odonata	Coenagrionidae	narrowwinged damselfly	3
Plecoptera	Perlidae	common stonefly	2
Rhyncobdellida	Glossiphoniidae	leech	1
Trichoptera	Hydropsychidae	common netspinner caddisfly	12

Macroinvertebrate Biotic Integrity = 4.109

BIOLOGIST NOTES:

Where this site was located on this tributary; it was dry upstream and the site contained some springs to maintain flow in August. One or two small riffles were dry or the water may have been flowing subsurface of the rocks. The fish IBI value of 98 is excellent. Good distribution of fish species for an area of stream that may be just pools in a very dry summer. MBI value of 4.109 for the aquatic insect community is excellent with no environmental impacts occurring. This value is in conformity with the fact that this site and stream occurs in an remote area of the flints hills with minimal human influences. Decent number of mayflies even with some of the riffles being low flow to dry.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Course Gravel -67%	Fine/silt -7%
Fine Gravel -2%	Cobble - 15%
Boulder - 7%	Wood - 2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	90	6	22
	Maximum	Minimum	Average
Right Bank -	110	4	27
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

97%	18%	72%
Maximum	Minimum	Average

Left side of stream - 72%
Right side of stream - 78%
Center of stream - 67%

BANK (INCISED) HEIGHT:

2.9	1.3	2.0
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 46%
Riffle - 26%
Pool - 27%
Dry Channel - 1%

175-RFM-07

South Fork Ninnescah River

Kingman Co.

NW/4 of NE/4 SEC. 1, 28S, 9W

9/8/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	1.5 feet shallowest - 12 inches deepest - 3 feet		
Stream Width	175.2' Maximum	93.9 ' Minimum	134.3' Average
Stream Flow	61.550 CFS		

2007 WATER CHEMISTRY

	2007
pH	8.4
Alkalinity	152 mg/l
Conductivity	1480 microSiemens
Total Dissolved Solids	735 mg/l
Nitrates	2.5 mg/l
Phosphorus	0.09 mg/l
Chlorides	276 mg/l
Ammonia	0.08 mg/l
Dissolved Oxygen	8.1 mg/l
Turbidity	20 FTU
Salinity	0.7 %
Water Temperature	68 F
Air Temperature	68 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
bluegill	49	1.9
bluntnose minnow	14	0.5
brook silverside	11	0.4
bullhead minnow	163	6.2
central stoneroller	29	1.1
channel catfish	53	2.0
common carp	22	0.8
fathead minnow	1	0.04
flathead catfish	3	0.1
freshwater drum	2	0.1
gizzard shad	2	0.1
green sunfish	117	4.4
largemouth bass	50	1.9
northern plains killifish	223	8.4
red shiner	1099	41.6
redear sunfish	1	0.04
river carpsucker	22	0.8
sand shiner	729	27.6
suckermouth minnow	16	0.6
warmouth	3	0.1
western mosquitofish	30	1.1
yellow bullhead	1	0.04
Total	**2640**	**100**

Index of Biotic Integrity = 77

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
giant floater	No	Yes	No
pondhorn	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	1
Basomamatophora	Hydrobiidae	hydrobid snail	6
Basomamatophora	Planorbidae	orb snail	1
Coleoptera	Dytiscidae	predaceous diving beetle	1
Coleoptera	Elmidae	riffle beetle	3
Coleoptera	Helodidae	marsh beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	2
Diptera	Chironomidae	midge	32
Diptera	Simuliidae	black fly	2
Diptera	Tipulidae	crane fly	1
Ephemeroptera	Baetidae	small minnow mayfly	79
Ephemeroptera	Caenidae	small squaregills mayfly	57
Ephemeroptera	Ephemeridae	common burrower mayfly	11
Ephemeroptera	Heptageniidae	flatheaded mayfly	2
Ephemeroptera	Isonychiidae	brushlegged mayfly	1
Ephemeroptera	Tricorythidae	little stout crawler mayfly	24
Heteroptera	Belostomatidae	giant water bug	2
Heteroptera	Veliidae	shortlegged strider	1
Notostraca	Triopsidae	tadpole shrimp	1
Odonata	Calopterygidae	broadwinged damselfly	3
Odonata	Coenagrionidae	narrowwinged damselfly	5
Odonata	Gomphidae	club-tailed dragonfly	10
Trichoptera	Hydropsychidae	common netspinner caddisfly	44
Trichoptera	Leptoceridae	longhorned caddisfly	6
Tricladida	Planariidae	flatworm	1
Veneroida	Corbiculidae	Asian clam	3
Veneroida	Pisidiidae	peaclam	3

Macroinvertebrate Biotic Index = 5.156

BIOLOGIST NOTES:

This survey was the lower control site of a weir stabilization project on the Byron Walker Wildlife Area, (east bridge) completed December 2006, immediately upstream of this site.

As usual, the chlorides and salinity levels increase on the wildlife area and the nitrate level seems somewhat elevated for this time of year. IBI value of 77 is good, there is also a decent diversity of fish species present. MBI value of 5.156 is considered moderate environmental impacts but this value would be regarded very good for this part of Kansas and on this wide of a river.

There will be four more surveys at this location over the next four consecutive summers.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -89% Fine/silt -9%
Fine Gravel -2%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	121	27	58
	Maximum	Minimum	Average
Right Bank -	120	30	62
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

32%	10%	10%
Maximum	Minimum	Average

Left side of stream - 23%
Right side of stream - 37%
Center of stream - 1%

BANK (INCISED) HEIGHT:

3.9	1.6	2.9
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 63%
Pool - 37%

176-RFM-07

South Fork Ninnescah River

Kingman Co.

SE/4 of SW/4 SEC. 36, 27S, 9W

9/8/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	1.9 feet shallowest - 12 inches deepest - 3.7 feet		
Stream Width	128.7' Maximum	55.9' Minimum	80.9' Average
Stream Flow	58.810 CFS		

2007 WATER CHEMISTRY

	2007
pH	8.3
Alkalinity	192 mg/l
Conductivity	1521 microSiemens
Total Dissolved Solids	756 mg/l
Nitrates	3.1 mg/l
Phosphorus	0.16 mg/l
Chlorides	315 mg/l
Ammonia	0.01 mg/l
Dissolved Oxygen	8.4 mg/l
Turbidity	15 FTU
Salinity	0.7 %
Water Temperature	79 F
Air Temperature	102 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
black crappie	4	0.7
bluegill	41	7.7
bluntnose minnow	2	0.4
brook silverside	24	4.5
bullhead minnow	20	3.7
channel catfish	20	3.7
common carp	6	1.1
flathead catfish	1	0.2
freshwater drum	5	0.9
gizzard shad	13	2.4
green sunfish	23	4.3
largemouth bass	27	5.0
northern plains killifish	4	0.7
orangethroat darter	2	0.4
quillback	9	1.7
red shiner	220	41.1
river carpsucker	46	8.6
sand shiner	31	5.8
suckermouth minnow	5	0.9
walleye	1	0.2
warmouth	3	0.6
western mosquitofish	26	4.9
white crappie	2	0.4
Total	**535**	**100**

Index of Biotic Integrity = 77

Freshwater Mussel Community

No mussels collected

Macroinvertebrate Community

Order	Family	Common Name	Number
Amphipoda	Gammaridae	scud	46
Basomamatophora	Hydrobiidae	hydrobid snail	3
Basomamatophora	Physidae	pouch snail	6
Coleoptera	Elmidae	riffle beetle	1
Coleoptera	Haliplidae	crawling water beetle	1
Coleoptera	Hydrophilidae	water scavenger beetle	4
Diptera	Ceratopogonidae	biting midge	3
Diptera	Chironomidae	midge	58
Diptera	Simuliidae	black fly	1
Ephemeroptera	Baetidae	small minnow mayfly	63
Ephemeroptera	Caenidae	small squaregills mayfly	32
Ephemeroptera	Ephemeridae	common burrower mayfly	2
Ephemeroptera	Isonychiidae	brushlegged mayfly	5
Ephemeroptera	Tricorythidae	little stout crawler mayfly	3
Heteroptera	Belostomatidae	giant water bug	3
Heteroptera	Corixidae	water boatman	2
Odonata	Calopterygidae	broadwinged damselfly	4
Odonata	Coenagrionidae	narrowwinged damselfly	6
Odonata	Gomphidae	club-tailed dragonfly	16
Odonata	Libellulidae	common skimmer dragonfly	2
Trichoptera	Hydropsychidae	common netspinner caddisfly	13
Trichoptera	Leptoceridae	longhorned caddisfly	1
Tricladida	Planariidae	flatworm	1
Veneroida	Corbiculidae	Asian clam	1
Veneroida	Pisidiidae	peaclam	3

Macroinvertebrate Biotic Index = 5.870

BIOLOGIST NOTES:

This survey was the site of a weir stabilization project on the Byron Walker Wildlife Area, (east bridge) completed December 2006.

This survey was conducted immediately after site 175-RFM-07, in the afternoon. Water chemistry values are typical with other sites on the wildlife area. Initially, the building of the weirs have taken away some habitat on the right bank. There seems to be a significant decrease in number of red shiners at this site than downstream. The weirs appeared to have provided habitat for crappie, quillback, and river carpsuckers. The weirs create both a pool habitat for the crappie and also increase flow velocities off the end of the weirs which the quillback and river carpsucker utilize. IBI value of 77 is good but could be somewhat weighted by the fish community consisting of 25% introduced fish species. The MBI value of 5.870 is considered high impact but is not a too bad of a value for this part of the state and this size of river. The introduction of the weirs may have also reduced macroinvertebrate habitat.

There will be four more surveys at this location over the next four consecutive summers.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -82%	Fine/silt -4%
Fine Gravel -5%	Boulder - 9%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	57	2	34
	Maximum	Minimum	Average
Right Bank -	76	4	31
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

87%	0%	14%
Maximum	Minimum	Average

Left side of stream - 21%
Right side of stream - 13%
Center of stream - 8%

BANK (INCISED) HEIGHT:

3.9	2.0	2.7
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 41%
Pool - 59%

177-RFM-07

South Fork Ninnescah River

Kingman Co.

NE/4 of NE/4 SEC. 3, 28S, 9W

9/22/07

2007 STREAM COMPARISONS

	2007		
Length of Sample Site	984 feet		
Average Stream Depth	1.8 feet shallowest - 15 inches deepest - 2.6 feet		
Stream Width	112.1' Maximum	36.4' Minimum	77.6' Average
Stream Flow	65.260 CFS		

2007 WATER CHEMISTRY

	2007
pH	8.3
Alkalinity	140 mg/l
Conductivity	1483 microSiemens
Total Dissolved Solids	736 mg/l
Nitrates	1 mg/l
Phosphorus	0.11 mg/l
Chlorides	288 mg/l
Ammonia	0.05 mg/l
Dissolved Oxygen	6.9 mg/l
Turbidity	18 FTU
Salinity	0.7 %
Water Temperature	68 F
Air Temperature	66 F

FISH POPULATION COMPARISONS

SPECIES	2007	
	#	% BY #
Arkansas darter	6	0.7
black buffalo	4	0.5
bluegill	7	0.8
bluntnose minnow	1	0.1
brook silverside	7	0.8
bullhead minnow	6	0.7
channel catfish	35	4.2
common carp	10	1.2
fathead minnow	1	0.1
flathead catfish	13	1.6
freshwater drum	4	0.5
gizzard shad	4	0.5
green sunfish	148	17.7
largemouth bass	6	0.7
northern plains killifish	4	0.5
orangethroat darter	1	0.1
quillback	35	4.2
red shiner	425	50.8
river carpsucker	20	2.4
sand shiner	35	4.2
suckermouth minnow	1	0.1
walleye	1	0.1
western mosquitofish	60	7.2
yellow bullhead	2	0.2
Total	**836**	**100**

Index of Biotic Integrity = 84

Freshwater Mussel Community

Common Name	Live	Recent	Weathered
Asain clam	Yes	Yes	No
giant floater	No	Yes	No

Macroinvertebrate Community

Order	Family	Common Name	Number
Basomamatophora	Hydrobiidae	hydrobid snail	4
Basomamatophora	Physidae	pouch snail	2
Coleoptera	Dytiscidae	predaceous diving beetle	2
Coleoptera	Elmidae	riffle beetle	1
Diptera	Chironomidae	midge	17
Diptera	Simuliidae	black fly	2
Ephemeroptera	Baetidae	small minnow mayfly	87
Ephemeroptera	Caenidae	small squaregills mayfly	8
Ephemeroptera	Isonychiidae	brushlegged mayfly	5
Ephemeroptera	Tricorythidae	little stout crawler mayfly	8
Heteroptera	Veliidae	shortlegged strider	8
Odonata	Calopterygidae	broadwinged damselfly	19
Odonata	Coenagrionidae	narrowwinged damselfly	1
Odonata	Gomphidae	club-tailed dragonfly	6
Trichoptera	Hydropsychidae	common netspinner caddisfly	35
Trichoptera	Leptoceridae	longhorned caddisfly	7
Veneroida	Corbiculidae	Asian clam	3

Macroinvertebrate Biotic Index = 4.716

BIOLOGIST NOTES:

This survey was the site of a bank stabilization project on the Byron Walker Wildlife Area, (west bridge) completed in December 2006.

The entire right bank of this site was rip-rap. This bank stabilization project was to keep the channel of the river in correct alignment with the position of the bridge on highway 54. By adding the rip-rap it narrowed the channel and increased the velocity of the river. The river hasn't cut down (became deeper) as expected but there seems to be an increase of undercut bank on the stable vegetated left bank. IBI value of 84 is good. There is an increase of buffalo, quillback, and river carpsucker at this site. The narrowing of the river has created a faster velocity and deeper channel along the rip-rap which these species seem to be utilizing. Many juvenile flathead and green sunfish were utilizing the spaces in the rip-rap of the right bank. Although there wasn't a large diversity of aquatic insects collected, the MBI value of 4.176 is decent. As expected, the large rip-rap on the right bank basically reduced the aquatic insect habitat by half.

There will be four more surveys at this location over the next four consecutive summers.

2007 PHYSICAL HABITAT MEASUREMENTS

STREAM SUBSTRATE:

Sand -80% Fine/silt -4%
Boulder -16%

BANK ANGLE (in degrees): (Looking Downstream)

number greater that 90 is an undercut bank

Left Bank -	105	24	60
	Maximum	Minimum	Average
Right Bank -	49	20	38
	Maximum	Minimum	Average

CANOPY (OVERHEAD) STREAM COVER:

42%	0%	10%
Maximum	Minimum	Average

Left side of stream - 17%
Right side of stream - 8%
Center of stream - 5%

BANK (INCISED) HEIGHT:

3.3	1.6	2.7
Maximum	Minimum	Average

STREAM CHANNEL TYPE:

Glide - 32%
Pool - 68%