

U.S. DEPARTMENT OF INTERIOR, U.S. GEOLOGICAL SURVEY

SOUTH PLATTE RIVER--LIFELINE OF A REGION

by C.M. Tate, K.F. Dennehy, and Greg Luft

U.S. Geological Survey Open-file Report 99-56

"South Platte River--Lifeline of a Region"

U. S. GEOLOGICAL SURVEY VIDEO SCRIPT

"South Platte River--Lifeline of a Region"

Final Script

VIDEO

AUDIO

TIGHT SHOT OF RIVER IN
MOUNTAINS
OVERLAY TITLE
"SOUTH PLATTE RIVER-
LIFELINE OF A REGION"

NATURAL SOUND OPEN/WATER FLOWING

PAN OF SOUTH PARK

AERIAL OF RIVER IN
PLAINS LOOKING LIKE
END OF BASIN

NARRATOR (VOICE-OVER, VO): It's
northeastern Colorado's water-supply lifeline. But
what do you know about the South Platte River?
Where does it start...and where does it end? What
happens to the water along its journey? And, why
should we care?

AERIAL SHOTS OF THE
SOUTH PLATTE RIVER
IN MOUNTAINS,

In the next few minutes, we'll become familiar with
the river, answering these and other questions.

AERIAL SHOTS OF THE
SOUTH PLATTE RIVER
IN TRANSITION ZONE

MUSIC UP THEN IN FULL, MUSIC DOWN AND
UNDER

AERIAL SHOTS OF THE
SOUTH PLATTE RIVER
IN PLAINS

The South Platte River and it's tributaries provide
critical water supplies.

"South Platte River--Lifeline of a Region"

VIDEO

AGRICULTURE SCENE

SOMEONE DRINKING
WATER.

RAFTING

POWER PLANT

SHOT OF RIVER

SHOT OF WELL

FADE TO MAP SHOWING 3
STATES AND OUTLINE OF
SOUTH PLATTE RIVER
BASIN--**GRAPHIC #1**
file: videograph1.eps

MAP OF BASIN SHOWING
SOUTH PLATTE AND
MAJOR TRIBUTARIES--
GRAPHIC #2
file: videograph2.eps

SAME MAP HIGHLIGHTING
THE SOUTH PLATTE
RIVER--**GRAPHIC #2b**
file: videograph2b.eps

SAME MAP HIGHLIGHTING
TRIBUTARIES--**GRAPHIC
#2c**

AUDIO

NARRATOR (VO): More than two-thirds of Colorado's population, about two and a half million people, rely on the basin's water for agriculture, public water supplies, recreation, and power generation.

Most of that supply, about 71 percent, is taken from river water, and the rest is pumped from wells that tap underground sources called aquifers.

The South Platte River Basin covers 24-thousand square miles and includes much of northeastern Colorado and small portions of Wyoming and Nebraska.

The river basin or watershed is defined as the region drained by the South Platte River and its tributary streams.

"South Platte River--Lifeline of a Region"

VIDEO

GO BACK TO **GRAPHIC #2b** WITH SOUTH PLATTE RIVER HIGHLIGHTED
file: videograph2b.eps

OVERLAY THE BELOW SHOTS ON GRAPHIC #2

CUT TO SHOT OF SNOW ON MOUNTAINS

SHOTS OF STREAMS IN MOUNTAINS

TRANSITION ZONE

PLAINS STREAM

DRY LANDSCAPES WITH GREENBELT

CUT TO STRONTIA SPRINGS DAM

AUDIO

NARRATOR (VO): The South Platte River is 450 miles long. Most of the flow comes from snowmelt in the mountains.

Along its journey, the South Platte assumes three distinct personalities. First at its origin, it cascades as a picturesque mountain stream. Second it flows through a transition zone from high country to the flatlands. Finally, it spreads out as a braided channel, meandering across the plains into Nebraska. Here it joins the North Platte River to form the Platte River.

The South Platte truly is a water lifeline for this region... but in order to meet all the demands for water, the water system has become highly regulated.

"South Platte River--Lifeline of a Region"

VIDEO

TALKING HEAD
OVERLAY
CHIPS BARRY
DENVER WATER

AERIAL SHOWING LITTLE
WATER IN PLAINS

CUT TO SIMILAR SHOT
WITH MORE WATER

CUT TO MAP OF SOUTH
PLATTE BASIN---
GRAPHIC #2
file: videograph2.eps

HIGHLIGHT TRANS-
MOUNTAIN DIVERSIONS--
GRAPHIC #3a
file: videograph3A.eps

OVERLAY SHOTS OF
ROBERTS TUNNEL

HIGHLIGHT RESERVOIRS
ON MAP---**GRAPHIC #3b**
file: videograph3b.eps

OVERLAY SHOTS OF
RESERVOIRS

AUDIO

C. BARRY (SOT): "Water management here means you have to assemble water from a lot of different places in the state, bring it together in a coordinated fashion so you can serve people..."

NARRATOR (VO): Historically, the South Platte River dried up on the plains in the summer. Now, water management keeps the water flowing all year.

Here's a look at how the management process works.

Water is imported from west of the Continental Divide through 12 trans-mountain diversions into tributary streams.

...it is stored in dozens of reservoirs...

"South Platte River--Lifeline of a Region"

VIDEO

DIVERSIONS HIGH-
LIGHTED---**GRAPHIC #3c**
file: videograph3c.eps

OVERLAY SHOT OF
DIVERSIONS

HIGHLIGHT WELLS---
GRAPHIC #3d file:
videograph3d.eps

OVERLAY SHOT OF
WELLS OR PIVOT
IRRIGATION

IRRIGATION SHOT IN
FIELDS

SHOT OF LIVESTOCK

ICE IN GLASS

WATERING FLOWERS
NEAR 19TH ST BRIDGE

SHOT OF COMMERCE
CITY

PERSON FISHING

POWER PLANT

CLOSEUP SHOT OF
WATER FLOWING
DOWNSTREAM

AUDIO

NARRATOR (VO): ... and is diverted from
streams for variety of uses.

In addition, several thousand wells pump water
from shallow aquifers along the South Platte and
its tributaries.

By the time any of the river's water leaves the
basin, it's been used and recycled for various
purposes including irrigation and watering
livestock; water supplies for domestic, commercial,
and industrial uses; recreation; and power
generation. Each of these uses can affect the
quality of water and its suitability for other uses
downstream.

"South Platte River--Lifeline of a Region"

VIDEO

USGS SCIENTIST TAKING
WATER SAMPLE AT LOW
FLOW

CUT TO USGS SCIENTIST
TAKING WATER SAMPLES
FROM CABLE CAR

USGS SCIENTIST
POURING SAMPLE INTO
CONE SPLITTER.

USGS SCIENTIST TAKING
GROUND WATER
SAMPLES

USGS SCIENTIST (BRET)
POURING WATER
SAMPLE INTO
GRADUATED CYLINDER,
ADDING REAGENTS
WHICH CAUSE SAMPLE
TO TURN BLUE, THEN
TITRATE TILL BLUE
WATER DISAPPEARS

TALKING HEAD
OVERLAY
KEVIN DENNEHY
U.S. GEOLOGICAL
SURVEY

AUDIO

NARRATOR (VO): Because of the river's importance to the region, scientists from the U.S. Department of the Interior, U.S. Geological Survey have been studying the quality of water in the South Platte River, its tributaries, and associated shallow aquifers. The USGS is the nation's earth science information agency.

This study is part of a USGS National Water-Quality Assessment Program known as NAWQA.

Between 1991 and 1996, the USGS set out to learn as much as possible about the surface and ground water resources in the basin.

K. Dennehy (SOT): "The goals of NAWQA are three-fold, first to provide a nationally consistent description of current water quality conditions of the Nation's Water Resources, ...

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

CUT TO NATURAL SHOTS
OF RIVER

K. Dennehy (VO): ..second is assess the long-term trends in water quality, and third is to identify, describe and explain to the extent possible the various natural and human factors that affect water quality and trends."

CUT TO CLOSE UP OF
TRASH IN WATER OR
OTHER OBVIOUS SHOT
OF HUMANS AFFECT ON
WATER

USGS CREW MEASURING
HABITAT

NARRATOR (VO): The South Platte study examined physical, chemical, and biological characteristics of water within the river basin.

SHOTS OF METERS IN
WATER

ELECTROFISHING/FISH IN
BUCKETS/ MEASURING
AND RECORDING LENGTH
AND WEIGHT IN
MOUNTAIN SETTINGS

The water analysis...as well as biological studies...provided critical data that enabled scientists to document natural and human affects on water quality in the South Platte River Basin.

FADE TO GRAPHIC OF
MAP OF THE SOUTH
PLATTE RIVER BASIN
WITH THE MOUNTAINS
HIGHLIGHTED---

MUSIC UP AND OUT

GRAPHIC #4a file:
videograph4a.eps

SCENIC SHOTS OF SNOW
COVERED MOUNTAINS

NATURAL SOUND/INGERSOLL'S SKIS IN
SNOW

"South Platte River--Lifeline of a Region"

VIDEO

USGS SCIENTIST
SKIS/SNOW SHOES FROM
ABOVE MEDIUM SHOT OF
GEORGE AND JEFF
PASSING BY
WIDE VISTA FROM TOP
OF CONTINENTAL DIVIDE

SHOTS CONTINUED

TILT DOWN TO SHOW
GEORGE AND JEFF
DIGGING

TIGHTER SHOT OF
DIGGING

TALKING HEAD
OVERLAY
GEORGE INGERSOLL
U.S. GEOLOGICAL
SURVEY

AUDIO

NARRATOR (VO): These USGS hydrologists
work high in the Rocky Mountains...and today
they're on their way up to the Continental Divide,
where the South Platte River and its tributaries
begin.

This is an annual trip to study snowfall
accumulation and its chemical composition.

NATURAL SOUND OF DIGGING

G. INGERSOLL (SOT): "Well, we're preparing a
snowpit all the way down to ground level to sample
the annual snowpack here near Loveland Pass at
about 11,900 feet. With the primary objective of
looking at water quality."

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

SHOW GEORGE DIGGING
LAYERS FOR SAMPLE

GEORGE COLLECTING
SAMPLE

GEORGE AND JEFF
TAKING SAMPLE DOWN
HILL

GENERIC SHOTS OF
CLOSEUP OF VEHICLE
EMISSIONS

VAPORS OR DUST IN AIR
FROM FARMING
ACTIVITIES

CUT TO SHOT OF SNOW
IN MOUNTAINS NEAR
CONTINENTAL DIVIDE

G. INGERSOLL (VO): "In this basin, in these mountains roughly two-thirds to three-quarters of the annual precipitation falls as snow. And it offers us an excellent opportunity to capture the majority of the annual precip in one sample."

NARRATOR (VO): These scientists discovered that chemicals, primarily nitrogen compounds from human sources such as, power plants, motor vehicle emissions, and agricultural practices are being transported through the atmosphere and deposited in the snow in trace amounts; although trace amounts of these chemicals generally have little affect on the quality of water for drinking, they are evidence that humans impact the environment.

This information is important because snow in the mountains provides the major source of water supplies for the South Platte River Basin.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

SHOT OF CLEAR CREEK
FLOODING

VIEW OF CHEESEMAN

CUT TO AERIAL OF
STRONTIA SPRINGS

AERIAL OF DIVERSION
INTO HIGHLINE CANAL
SHOW CANAL AND RIVER
RUNNING PARALLEL

CUT TO OUTFLOW FROM
STRONTIA SPRINGS DAM

SERIES OF SHOTS OF
MINE TAILINGS ALONG
CLEAR CREEK

NARRATOR (VO): The mountain snowpack begins to thaw in late spring... and results in high streamflows. Reservoirs on the South Platte River like Eleven Mile, Cheeseman, and Strontia Spring, slow the flow of water...and capture snowmelt runoff for public water supplies and agricultural use later in the year.

In addition, numerous canals divert water from the river.

As a result, the South Platte River's natural flow is significantly altered all along its course.

Like flow, water quality has also been affected by humans.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

MINE TAILING SHOTS
CONTINUED

NARRATOR (VO): The biggest effect on water quality in some mountain streams is a remnant of Colorado's mining past and present. Old, abandoned mines along South Platte tributaries, most notably Clear Creek, can degrade water quality locally. Runoff from mine tailings is often acidic and contaminated with metals ...

SHOT OF ARGO TUNNEL
SHOWING DATE

PAN OF DUCK CREEK
AND GENEVA CREEK
GOING FROM CLEAN
WATER TO WHITE
STREAMBED TO ORANGE
STREAMBED

As a result, streambed sediments are locally discolored and large quantities of metals, such as, iron, manganese, zinc, copper, and aluminum are found in both water and sediment.

CLOSEUP OF IRON OXIDE
IN STREAM CHANNEL

Small quantities of metals are needed by all living things. However, in large amounts these metals become toxic.

CUT TO SHOT OF WHITE
COATED STREAM WHICH
GIVE THE APPEARANCE
OF BEING STERILE

As a result, algae, insect, and fish communities were less diverse or absent in tributaries affected by mining compared to other mountain streams.

FADE TO ESTES PARK
SHOTS

AUDIO BREAK--RELATED TO POPULATION IN MOUNTAINS--BEEPING HORNS, ETC.,

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

CUT TO SHOTS OF
HOUSES AT LOOKOUT
MOUNTAINS

NARRATOR (VO): Increasing populations in the mountains place additional and more widespread stress on the water resources. With increased growth comes the potential for contamination from a variety of sources such as, leaking domestic septic systems, soil erosion from construction near streams, or runoff from more pavement.

SHOT OF PEOPLE ALONG
THE BIG THOMPSON
RIVER IN DOWNTOWN
ESTES PARK

Among the mountain tributaries sampled, concentrations of dissolved solids, suspended sediment, nitrogen, and phosphorus were higher in areas with more development.

SHOT OF CLEAR WATER

CUT TO SHOT OF MUDDY
WATER (HIGH FLOW AT
CLEAR CREEK)

Dissolved solids are minerals and salts dissolved in water and can affect taste. The amount of suspended sediment determines how muddy a river appears.

CLOSEUP SHOT OF
GREEN ALGAE STRAND IN
CLEAN RIVER (MORAINE
PARK)

Increases in nitrogen and phosphorus can fertilize the river resulting in the growth of nuisance algae which can affect stream aesthetics.

"South Platte River--Lifeline of a Region"

VIDEO

SHOT OF USGS
SCIENTIST COLLECTING
WATER SAMPLE AT
MORAINE PARK

TALKING HEAD
OVERLAY
DAVID LITKE
U.S. GEOLOGICAL
SURVEY

CUT TO CLOSEUP OF
CLEAN WATER FLOWING
OVER ROCKS (MORAINE
PARK)

FILLING GLASS OF
WATER

CUT TO CLOSEUP OF
TROUT

AUDIO

NARRATOR (VO): The effects of mining and increased population on water quality however, are localized geographically and have minimal effect on the overall water quality of rivers in the mountains.

D. LITKE (SOT): "Well water quality in the mountain streams in Colorado is generally of excellent quality. Mostly because the source of the water is from pure mountain snowmelt higher in the mountains.

D. LITKE (VO): Matter of fact, the water quality is almost as good as distilled water. The water is very low in dissolved solids concentrations and also very low in suspended sediment. And, because the water is so pure you can use it for just about any use. And it also supports a very healthy cold water aquatic habitat."

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

BRET BRUCE SAMPLING
WELLS IN MOUNTAINS
AND WRITING DOWN
INFORMATION

NARRATOR (VO): Larger populations in the mountains also means more people use water from wells. Wells typically obtain water from fractures in the bedrock.

SHOTS FROM ABOVE
CONTINUED

Human activities can alter the natural water quality of ground water which is the major drinking water source for most mountain communities.

TALKING HEAD
OVERLAY
BRET BRUCE
U.S. GEOLOGICAL
SURVEY

B. BRUCE (SOT): "Ground water quality in the crystalline bedrock aquifer is good; We found some naturally occurring constituents, uranium and radon in particular. We did also detect man-made compounds which show that the aquifer is not completely isolated from human impacts."

AERIAL SHOT OF RIVER
IN MOUNTAINS AS IT
GOES OUT INTO THE
PLAINS

NARRATOR (VO): Although water quality in the mountains show signs of being affected by human factors, these influences are much less dramatic than the influences on the water resources once they leave the mountains.....

FADE OUT TO MAP

MUSIC UP

"South Platte River--Lifeline of a Region"

VIDEO

SOUTH PLATTE RIVER
MAP HIGHLIGHTING THE
FOOTHILLS/TRANSITION
ZONE

GRAPHIC # 4b file:
videograph4b.eps

AERIAL SHOT OF RIVER
LEAVING WATERTON
CANYON AND
MEANDERING BEFORE
REACHING CHATFIELD

SHOTS OF DIFFERENT
FISH SPECIES
HOLDING UP CARP
SUCKERS ON
MEASURING BOARD
OTHER SMALL FISH AT S.
PLATTE AT DENVER SITE

MAP WITH POPULATION
OF THE FRONT RANGE
URBAN CORRIDOR
HIGHLIGHTED---**GRAPH
#4C** file: videograph4c.eps

OVERLAY SHOTS AERIAL
SHOTS OF BEAR CREEK

AUDIO

MUSIC OUT

NARRATOR (VO): As the South Platte River and its tributaries leave the mountains and move towards the plains ... they flow through a transition zone. Changes in the rivers are dramatic... as the channels flatten and the water slows down.

Changes in the rivers' pace mean natural changes for life in and along the rivers.

The water warms up as it leaves the mountains, so fish communities also change. Coldwater species like rainbow and brown trout give way to carp, suckers, minnows, and other warm-water varieties.

The temperature change is natural, but other changes to the rivers are not. It is in this transition zone, that the South Platte River and its tributaries run through the most densely populated part of Colorado--the Front Range urban corridor.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

FOUNTAIN AT DENVER
WATER

SHOT OF CONFLUENCE
PARK AREA WITH BIKERS,
WALKERS

SHOT OF EFFLUENT

DIVERSION FOR
IRRIGATION

AERIAL SHOT OF DENVER
METRO AREA

AERIAL SHOT OF SOUTH
PLATTE RIVER AS IT
FLOWS INTO CHATFIELD
RESERVOIR

AERIAL OF CHATFIELD
DAM FROM RESERVOIR
CUT TO BEAR CREEK
DAM

AERIAL OF CHATFIELD
DAM FLIGHT OVER DAM
TO SEE STRAIGHT
CHANNEL

NARRATOR (VO): Here the rivers are used for recreational activities, such as walking, biking, and floating; disposal of domestic and commercial waste-waters and to a lesser extent for water supplies for irrigation.

To demonstrate urban effects on the South Platte River, the largest urban center---the Denver Metro area ---is used as an example.

As the South Platte leaves the mountains at Waterton Canyon, it flows toward Denver into Chatfield Reservoir.

Construction of Chatfield, Cherry Creek, and Bear Creek dams have greatly reduced the threat of flooding in the Denver area.

These dams provide safety for the people who live downstream along the river, but at the same time, they alter the river's natural character.

"South Platte River--Lifeline of a Region"

VIDEO

CONTINUED AERIAL OF
CHATFIELD RESERVOIR

CUT TO AERIAL OF
CONFLUENCE PARK
WHERE CHERRY CREEK
ENTERS SOUTH PLATTE

CUT TO CONFLUENCE OF
BEAR CREEK WITH
SOUTH PLATTE

SHOT OF EFFLUENT

CUT TO AERIAL OF
DIVERSIONS REMOVING
WATER FROM STREAM

MAKING COFFEE

SHOT OF COMMERCIAL
WATERING

SHOTS OF SPRINKLERS
WATER SOCCER FIELD

AERIAL SHOT OF DENVER
METRO WASTE-WATER
TREATMENT PLANT

CUT TO CLOSEUP OF
METRO OUTFLOW TO
STREAM

AUDIO

NARRATOR (VO): The amount of water in the South Platte River within the Denver Metro area is controlled by the release of water from Chatfield, the addition of water from tributaries, such as Cherry Creek and Bear Creek, and inflow of waste-water...

...water is withdrawn from the river for irrigation and cooling waters for power generation.

Denver like most urban areas obtains its drinking water from mountain sources. However, the wastewater from uses such as, bathing, cooking, washing clothes and dishes, flushing toilets, and watering lawns, is disposed of through a communal sewer systems and is treated at waste-water treatment plants. The treated effluent is then returned back to rivers.

"South Platte River--Lifeline of a Region"

VIDEO

CUT TO AERIAL OF
BURLINGTON DITCH
SHOWING ALMOST NO
FLOW IN RIVER
DOWNSTREAM OF
DIVERSION

AERIAL SHOTS
CONTINUED

CUT TO AERIAL OF
DENVER METRO WASTE-
WATER SUPPLYING
ALMOST ALL FLOW TO
RIVER.

CLOSEUP OF DRIPPING
PIPES NEXT TO THE
RIVER

AUDIO

NARRATOR (VO): The combination of the amount and source of water can have a profound effect on the river.

For example, when demand for irrigation water is highest, water is diverted, leaving the river nearly dry before it reaches the Denver metro area's major waste-water treatment plant.

That means that during some parts of the year when streamflow is low, almost all of the water in the river immediately below the plant is treated effluent.

Water quality in urban areas can be affected by two sources of contamination to the river, point and non-point sources.

"South Platte River--Lifeline of a Region"

VIDEO

OUTFLOW BY SOUTH
PLATTE AT DENVER SITE

CUT TO MORE PIPES

TALKING HEAD
OVERLAY
BOB ERICKSON, PhD
U.S. ENVIRONMENTAL
PROTECTION AGENCY,
REGION 8

CUT TO SHOT OF SIGN
SAYING RIVER CLOSED

AUDIO

NARRATOR (VO): Point sources are from pipes or outflows from waste-water treatment plants, factories, or urban drains.

Point sources can cause water-quality problems ...but they're also the easiest to identify and control.

BOB ERICKSON (SOT): "The Clean Water Act came into effect in 1972. Congress gave to States the right to control their own water quality with EPA as oversight. They also gave to the states the right to have permit limits to put on all point sources that went into the river. EPA oversees the States, the State oversees the dischargers. I kayak and canoe the South Platte river for about 45 miles. Twenty years ago--no way."

B. ERICKSON (VO): There was raw sewage dumping directly into the South Platte River. To go in there you actually risked your life.

"South Platte River--Lifeline of a Region"

VIDEO

CUT TO PEOPLE NEAR
AND AROUND THE RIVER

AERIAL SHOTS OF
WASTE-WATER
TREATMENT PLANTS
AT ENGLEWOOD,
DENVER METRO
CLOSE UP OF
METRO, 19TH ST. BRIDGE

CLOSEUP OF METRO
EFFLUENT FOAMING
DOWNSTREAM

CLOSE UP OF BRIGHT
GREEN ALGAE ON ROCKS
AT SOUTH PLATTE RIVER
AT DENVER

AUDIO

NARRATOR (VO): Since the Clean Water Act was passed, point sources are not as much of a problem as they use to be.

Although there have been substantial improvements, twenty five municipal waste-water treatment plants located along the Front Range urban corridor still discharge about seven thousand tons of nitrogen and twelve hundred tons of phosphorus into the river every year.

These urban areas contribute treated effluent which dominates the flow in the South Platte River for 60 miles downstream of Denver to near Greeley.

All living things need some nitrogen and phosphorus to grow, but the effects of too much nitrogen or phosphorus in water can trigger rapid algae growth which forms a green scum. As the algae decay, the water can be depleted of oxygen that insects and fish need to live.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

COMMERCIAL WATERING
LAWNS AND WATER
FLOWING INTO DRAINS

NARRATOR (VO): Water quality is also affected by contaminants entering the river from sources that can't be assigned to a specific location; these are called non-point sources.

TALKING HEAD
OVERLAY
ROBERT KIMBROUGH
U.S. GEOLOGICAL
SURVEY

R. KIMBROUGH (SOT): "Urban storm water runoff is a non-point source to the river that generally has high concentrations of compounds such as trace metals and household pesticides."

CONSTRUCTION SITE
ALONG RIVER IN DENVER

OILS ON PARKING LOTS

OILS WASHING INTO THE
DRAIN

NARRATOR (VO): Other non-point sources include sediment from construction sites, ...oils, grease and dissolved metals from paved areas...all of which can wash into streams.

CLOSEUP OF FERTILIZING
LAWN

COMMERCIAL
APPLICATION OF
CHEMICALS

PAN UNDER CAR

DOG IN PARK

Non-point sources also can affect groundwater. Over-application of fertilizers and pesticides, dumping of car fluids, and improper disposal of chemical and animal waste all pose a contamination source to groundwater.

"South Platte River--Lifeline of a Region"

VIDEO

CUT TO PETE AND BRET
SAMPLING WELLS IN
DENVER

TALKING HEAD
OVERLAY
PETE MCMAHON, PhD
U.S. GEOLOGICAL
SURVEY

CUT TO PUMPING OF GAS
INTO CAR AND DRIPPING

SHOT OF GAS AND OIL
ON PARKING LOT

FADE TO AERIAL SHOT
OF BEAR CREEK

AUDIO

NARRATOR (VO): This is particularly true for the alluvial aquifer that is located along and is connected to the river. Because the aquifer is connected to the river, contaminants that enter groundwater can end up in the river.

P. MCMAHON (SOT): "The alluvial aquifer in Denver is susceptible to contamination from the land surface because we have a shallow depth to groundwater here and the soils are very sandy, so the contaminants can move quickly from the land surface to the aquifer."

P. MCMAHON (VO): "Shallow groundwater in Denver is characterized by high dissolved solids and by trace concentrations of a variety of pesticides and volatile organic compounds such as gasoline components and cleaning solvents. All of those are from human sources; however, the aquifer also has high concentrations of radon and uranium which are from natural sources."

MUSIC BREAK

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

AERIAL OF BEAR CREEK
SHOWING VEGETATION

NARRATOR (VO): Human activities can affect not only the water chemistry, but also the natural habitat.

CUT TO AERIAL OF
CHERRY CREEK
SHOWING CONCRETE
WALLS AND NO
VEGETATION

In many areas, the natural habitat along the stream banks is gone because of channelization to control flow or bank stabilization to control erosion. These areas would normally support plant and animal life in and along the river.

CLOSEUP OF RIP-RAP ON
BANKS

VIEW OF CREW
PREPARING TO
ELECTROFISH SHOWING
DROP STRUCTURES, PIPE
WITH EFFLUENT

Alteration of natural habitat, and point and non-point sources, can affect the river's biological health.

USGS ELECTROFISHING
CREW COLLECTING FISH
AT SOUTH PLATTE AT
DENVER SITE

Whereas water samples provide a snapshot of water quality at a moment in time, analyses of fish can assess water quality over several years.

MEASURING AND
WEIGHING FISH AND
RECORDING
INFORMATION

"South Platte River--Lifeline of a Region"

VIDEO

TALKING HEAD
OVERLAY
CATHY TATE, PhD
U.S. GEOLOGICAL
SURVEY

COLLECTION OF ALGAE
WHERE ALGAE VISIBLE
ON ROCKS

COLLECTION OF INSECTS

CLOSEUP OF
INVERTEBRATES

CLOSEUP OF SUCKERS

AUDIO

C. TATE (SOT): "The fish communities are sensitive indicators of water quality in that physical or chemical changes in the river will affect the types of fish you find, the size of fish that you find, and the relative abundance of the fish."

NARRATOR (VO): Fish are just one measure of a river's health and it's ability to sustain life.

Scientists also collect less conspicuous life forms like algae and insects. These life forms provide

food for fish and can carry a wealth of information about water quality.

The USGS study found that the cumulative effect of contaminants and loss of habitat in urban areas decreased the number of insect and fish species in the river. Only tolerant species, like suckers and carp, could thrive in this environment.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

CLOSEUP OF
PROCESSING OF CARP
FOR CONTAMINANTS AT
SOUTH PLATTE AT
DENVER SITE

CARP BEING WEIGHED,
DISSECTED, AND LIVER
BEING REMOVED

FADE OUT

AERIAL OF DAMS

CHANNELIZATION,

CUT TO CLOSEUP OF
RIVER CHANNEL

DIVERSION OF FLOW

EFFLUENT FROM WASTE-
WATER TREATMENT
PLANT

FADE TO MAP OF SOUTH
PLATTE RIVER WITH
PLAINS REGION
HIGHLIGHTED---

GRAPHIC # 4d

file: videograph1.eps

NARRATOR (VO): Analyzing fish tissue can help detect long-term contaminants in the urban setting. For example, compounds, like PCB's and chlordane are still present in fish tissue even though the use of these chemicals were banned in the 1970s and 80s.

SOUND TRANSITION

NARRATOR (VO): Urban development has resulted in many different effects on the river. By the time the South Platte leaves the Front Range urban corridor, much of the water has been used at least once...treated, and returned to the river. This recycling of water has decreased the water quality compared to that in the mountains; but the water is still suitable for some downstream uses...in the plains.

MUSIC UP IN FULL AND DOWN

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

AERIAL EXPANSIVE SHOT
SHOWING BRAIDED
CHANNELS

NARRATOR (VO): The plains is the area of the South Platte River Basin east of Greeley...here the river assumes its third and final geographic personality.

CUT TO AERIAL WHEN
HELICOPTER IS DOWN IN
THE STREAM CHANNEL
AND WATCH BARS, LOGS,
TREES GOING BY.

The river meanders along its course... ...water moves slowly as the terrain flattens ... braided channels begin to form and the channel bottom becomes sandy. This is the beginning of a 200-mile journey through the plains.

FADE TO

SOUND BREAK

AERIAL SHOTS OF
FARMLANDS/FARM
HOUSES

NARRATOR (VO): In this part of the basin, agriculture is the primary land use, and the operation of thousands of farms requires large amounts of water.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

SERIES OF AERIAL OF
DITCHES/ HEADGATES

DITCH GOING TO
RESERVOIRS

SHOT OF RESERVOIR(S)

SHOT OF FARMER
HARVESTING POTATOES

TALKING HEAD
OVERLAY
PETE MCMAHON, PhD
U.S. GEOLOGICAL
SURVEY

NARRATOR (VO): Water is removed from the river and channeled through an extensive network of ditches and canals. Water is allocated according to state law based upon a priority system. Water use for any year is determined by how much water is in the river and stored in reservoirs.

All together, the river supports more than one million acres of irrigated farmland---crops include corn, sugar beets, potatoes, alfalfa, and many others.

P. McMahon (SOT): The aquifer and river that we're studying here in the agricultural area is the same as we studied in the Denver Metro area; however, the water quality problems in the agricultural area are different than those we saw in the Denver area. We see greater occurrence of pesticides and nitrate both of which have agricultural sources.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

CUT TO CLOSEUP OF
SPRAYING OF
CHEMICALS

FARMER PLANTING CROP
(FOOTAGE FROM KANSAS
VIDEO)

AERIAL OF EXPANSIVE
VIEW OF CENTER PIVOT
IRRIGATION SPRINKLERS

SHOT OF FLOOD
IRRIGATION WITH SIPHON
TUBES

SHOTS OF RETURN
FLOWS OR RUNOFF

SHOT OF PIVOT
IRRIGATION

NARRATOR (VO): In the early 1990s, northeastern Colorado farmers used as much as one thousand tons of pesticides, about 40,000 tons of phosphorus, and 200,000 tons of nitrogen to enhance crop production each year.

Much of the cropland is irrigated by ditches...but many thousands of acres are irrigated by sprinklers that use ground water from the South Platte alluvial aquifer beneath the irrigated lands.

Irrigation water from rivers, reservoirs, and aquifers are essential to successful agriculture in the plains. The pathway for greatest recycling of water between river, fields, and groundwater occurs during spring planting and the summer growing season. Here's how it works...

"South Platte River--Lifeline of a Region"

VIDEO

ABOVE GROUND
PROCESSES, CENTER
PIVOT AND DIVERSION OF
STREAM

GRAPHIC--files: tate#.ai
(where # = 1,2,3,3.5,4.0,
4.1)

CARTOON SHOWING
UNDERGROUND
PROCESS, FILTER
THROUGH SOIL,
GROUNDWATER AND
BACK TO STREAM---

GRAPHIC-- files: tate dia #
(where # = 1-4)

AERIAL OF CATTLE IN
FIELD

CUT TO AERIAL OF
FEEDLOT

CUT TO DRIVING ALONG
FEEDLOT SHOWING THE
LARGE NUMBER OF
CATTLE

CUT TO DAVE LITKE
TAKING WATER SAMPLE
AT SOUTH PLATTE RIVER
AT BALZAC

AUDIO

NARRATOR (VO): Fields are irrigated with water that's either pumped from the aquifer or diverted from the river ... water not used by crops or evaporated then filters down through the soil to the water table carrying with it agricultural chemicals....the groundwater along with the dissolved chemicals eventually flows back to the river to be diverted to crops and used again downstream.

The South Platte's water also is used for livestock. About 1.7 million cattle and about 400,000 hogs were raised in the basin during 1992.

Both land use and water use affect water quality.

"South Platte River--Lifeline of a Region"

VIDEO

USGS SCIENTIST
PROCESSING WATER
SAMPLE

CLOSEUP OF BANK
EROSION

CUT TO AERIAL OF FIELD
ADJACENT TO THE RIVER

SPRAYING OF
CHEMICALS ON FIELDS

CLOSE UP OF WAVES IN
SAND

CUT TO SHOT OF CARP
OR SUCKER

USGS SCIENTIST
SAMPLING WELLS

TALKING HEAD
OVERLAY
DR. PETE MCMAHON
U.S. GEOLOGICAL
SURVEY

AUDIO

NARRATOR (VO): The USGS study found higher suspended sediment in river water in the plains than in urban areas. The suspended sediments were primarily from stream bank erosion or runoff from agricultural fields.

Although present in low concentrations, twenty commonly used pesticides were detected in river and ground water. Some pesticides were also detected in streambed sediments and fish, including DDT, which was banned in 1972.

Dissolved solids and nitrate concentrations were higher in river water and ground water in the plains than in other parts of the basin.

P. MCMAHON (SOT): "High concentrations of nitrate in the agricultural area are a particularly sticky problem because the sources of nitrate are distributed over large geographic area."

"South Platte River--Lifeline of a Region"

VIDEO

SERIES OF AERIAL
SHOWING EXPANSE OF
AG FIELDS, FEEDLOTS,
FARM HOUSES

CUT TO BRET AND PETER
ANALYZING GROUND
WATER SAMPLES

CUT TO CLOSEUP SHOT
OF FARMHOUSE IN THE
PLAINS

TALKING HEAD
OVERLAY
RICHARD PARACHINI
COLORADO DEPT. OF
PUBLIC HEALTH AND
ENVIRONMENT
SOUTH PLATTE
WATERSHED
COORDINATOR

AUDIO

P. MCMAHON (VO): In addition, our studies have shown that once nitrate gets into the groundwater it can take anywhere from 10 to 25 years for that ground water to discharge to the South Platte River. This is important because it means that any implementation of better management practices at land surfaces today, may take decades before they show any improvements in ground water quality."

NARRATOR (VO): In general, the chemical analyses of water indicates that water quality is acceptable for agricultural uses.

However, high nitrate concentrations can affect the use of groundwater for a drinking water supply in some areas.

R. PARACHINI (SOT): "We do know of some areas in along the South Platte River beginning in the Denver Metro area and extending clear to the State line out by Julesburg where we have elevated nitrate levels in groundwater "

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

SHOT OF PERSON
DRINKING WATER (FROM
KANSAS VIDEO)

NARRATOR (VO): Although nitrate generally is not a concern for adults, drinking water high in nitrates can cause low oxygen levels in the blood of infants, a potentially fatal condition.

AERIAL SHOT OF SMALL
TOWNS

If drinking water supplies become contaminated with high nitrate concentrations, small communities or individual homeowners are faced with two expensive options; either treat the water to remove the nitrates or find a new, uncontaminated water supply.

CUT TO INDIVIDUAL
FARMS

FADE TO

AERIALS SHOWING
EXPANSE OF RIPARIAN
VEGETATION WITH OLD
CHANNELS AND HOW
SMALL CHANNELS ARE
THAT HAVE FLOW

NARRATOR (VO): Dams and diversions that regulate flow have affected water quality in the plains region and have affected the natural habitat in and along the banks of the river.

"South Platte River--Lifeline of a Region"

VIDEO

SHOTS ABOVE
CONTINUED

TALKING HEAD
OVERLAY
TOM NESLER
COLORADO DIVISION OF
WILDLIFE
AQUATIC NONGAME
WILDLIFE MANAGER

SHOT OF FISH EATING
ALGAE IN THE PLAINS

SHOTS OF PLAINS FISH

AUDIO

NARRATOR (VO): Spring floods caused by snowmelt in the mountains are no longer common because of flow regulation. The channel is five times narrower than it was over a century ago and there's more vegetation along the channel..and that changes the aquatic habitat.

T. NESLER (SOT): "This river has undergone significant, in fact almost complete transformation due to land and water development throughout its history. Of the 28 native fish species we have in the South Platte, ...

T. NESLER (VO): ...seven have declined to the point where we now protect them through State listing as threatened or endangered. We've also found out that the diversity of native fish population in the Eastern plains has decreased significantly in the just last 20 years. Fortunately, opportunities still exist for us to restore declining fish species. We can take encouragement in that the recovery effort for the Greenback cutthroat trout in the headwaters of the South Platte have been and are a success and that native fishes in the streams and rivers of the eastern plain still dominate the fish communities."

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

FADE OUT

MUSIC UP IN FULL

SCENIC SHOT OF
SURFACE OF WATER

MUSIC CONTINUED

"Water is the most critical
resource issue of our lifetime
and our children's lifetime.
The health of our waters is
the principal measure of how
we live on the land."

--Luna Leopold
Former USGS Chief Hydrologist,
& Emeritus Professor of Geology,
University of California, Berkeley

FISHING IN MOUNTAINS

KIDS IN RIVER

WATERING LAWN

IRRIGATION OF FARM

NARRATOR (VO): When you consider the many
demands on the South Platte's water, it's not
surprising that meeting these demands has
caused changes in the river system.

SHOTS IN
MOUNTAIN
TRANSITION ZONE
PLAINS

The quantity and quality of water have been
altered all along the river, from the mountains,
through the urban transition zone, to the plains.

"South Platte River--Lifeline of a Region"

VIDEO

SHOT OF STREAMFLOW
ALTERATIONS

RESERVOIRS

DIVERSIONS

SCENIC SHOT OF WATER
IN MOUNTAINS

HOUSING DEVELOPMENT

MINING SHOT

EFFLUENT FROM WASTE-
WATER TREATMENT
PLANT

PESTICIDE SHOT

SHOT OF GASOLINE DRIP

PEOPLE ALONG THE
RIVER IN URBAN AREAS

AUDIO

NARRATOR (VO): By regulating natural flows, the network of reservoirs and diversions has provided water supplies for a variety of uses and allowed the extensive use and reuse of water. Land use and the recycling of water have affected water quality throughout the basin.

In the mountains, water generally is of good quality for almost any use; however, increasing populations and past mining have degraded water quality locally.

In the urban transition zone, water quality is affected by contaminants from point sources, such as effluent from waste-water treatment plants, and non-point sources, such as fertilizers, pesticides, and gasoline components; however, water quality does not limit the river's use for recreation or water supplies for irrigation.

"South Platte River--Lifeline of a Region"

VIDEO

AUDIO

APPLICATION OF
CHEMICALS

BANK EROSION IN
STREAM CHANNEL

NARRATOR (VO): In the plains, water quality is affected by fertilizers, pesticides, and suspended sediment from erosion of river banks and runoff from fields. While water quality does not adversely affect the use of water for irrigation, in some areas, high nitrate concentrations in ground water can limit its use as a drinking water supply.

SHOT OF STREAMFLOW
ALTERATION

HABITAT ALTERATION

BIOLOGICAL COMMUNITY

In addition, contaminants, flow regulation, and alteration of habitat have decreased the diversity of biological communities in urban and agricultural areas.

FADE TO

AUDIO BREAK/SOUND OF WATER FLOWING

TALKING HEAD
OVERLAY
TOM NESLER
COLORADO DIVISION OF
WILDLIFE
AQUATIC NONGAME
WILDLIFE MANAGER

T. NESLER (SOT): "As a human society we have to recognize that we are not the only species that relies on the Platte River System for survival."

"South Platte River--Lifeline of a Region"

VIDEO

SCENIC SHOT OF RIVER
AND WATER

AUDIO

T. NESLER (VO): "We also have to recognize that our actions affect the physical, chemical, and biological functions of the river and that these actions also have consequences throughout the river system."

MUSIC UP IN FULL FOR THE REMAINDER OF
THE CREDITS

VIDEO

USGS NAWQA
PUBLICATIONS ON TABLE

OVERLAYS ONTO VIDEO SHOTS

For More Information on the USGS National
Water-Quality Assessment Study Contact:

District Chief

U.S. Geological Survey

P.O. Box 25046, MS 415

Denver, CO 80225

Or Visit the U.S. Geological Survey's South Platte
Web Site at:

<http://webserver.cr.usgs.gov/nawqa/splt>

"South Platte River--Lifeline of a Region"

VIDEO

OVERLAYS ONTO VIDEO SHOTS OF BASIN

EXECUTIVE PRODUCERS:

Cathy Tate, Kevin Dennehy

PRODUCED BY:

Kathy Finan, Chris Schneider, Jef Pirkey

WRITTEN BY:

Cathy Tate, Kevin Dennehy, Greg Luft

DIRECTED BY:

Kevin Dennehy, Cathy Tate

PRODUCTION SUPERVISED BY:

Bill Green

NARRATED BY:

Debby Richards Perugini

EDITED BY:

Chris Schneider and Bill Green

CAMERA:

Scott Tuke, Rand Lechner, Charlie Snyder, Greg
Luft

"South Platte River--Lifeline of a Region"

VIDEO

OVERLAYS ONTO VIDEO SHOTS OF BASIN

AUDIO BY:

Derrick Ferrel, Chris Schneider, Kathy Finan

GRIP BY:

Derrick Ferrel, Chris Schneider, Chris Jacek

GRAPHICS BY:

John Evans, Sharon Qi, Anthony Sanchez

APPRECIATION IS EXTENDED TO THE
FOLLOWING INDIVIDUALS AND AGENCIES
THAT CONTRIBUTED TO THIS VIDEO

Chips Barry, Jane Earl, and Greg Bryant
Denver Water

Richard Parachini
South Platte Watershed Coordinator
Water Quality Control Division
Colorado Department of Public Health and
Environment

"South Platte River--Lifeline of a Region"

VIDEO

OVERLAYS ONTO VIDEO SHOTS OF BASIN

Tom Nesler

Aquatic Nongame Wildlife Manager

Colorado Division of Wildlife

Department of Natural Resources

Bob Erickson, PhD

U.S. Environmental Protection Agency

Region 8

Andrew Lillie

University of Colorado, Boulder

Zelda Chapman Bailey, Linda Britton, John Flager,

Elisa Graffy, George Ingersoll, Kyle Juracek, Heidi

Koehler, Dave Litke, and Steve Vandas

U.S. Geological Survey

Bret Bruce, Kevin Dennehy, Janet Heiny, Robert

Kimbrough, David Litke, Pete McMahon, Sharon

Qi, Dennis Smits, and Cathy Tate

Members of the USGS South Platte NAWQA

Study team

"South Platte River--Lifeline of a Region"

VIDEO

OVERLAYS ONTO VIDEO SHOTS OF BASIN

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