OVERVIEW OF THE WILLOW CREEK WATERSHED PLANNING EFFORTS

Blackfeet Nonpoint Pollution Program

May 30th, 2006

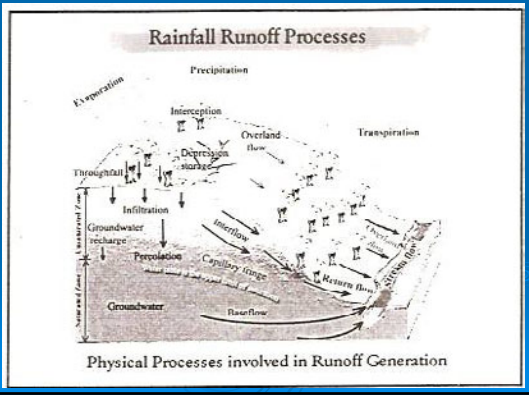
Program Coordinator: Ardis Berthelson

Learn the basics of Hydrology and Watershed Processes

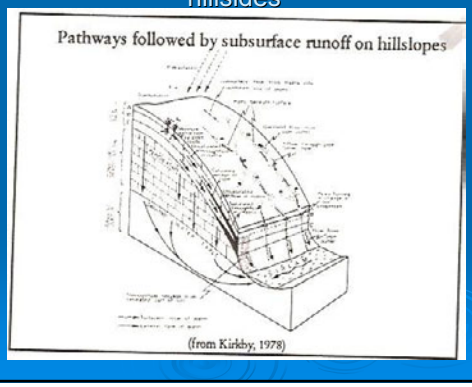
Goals

- Understand the role of hydrology and watershed processes.
- Look for trainings targeted at watershed processes
- Water quality standards training

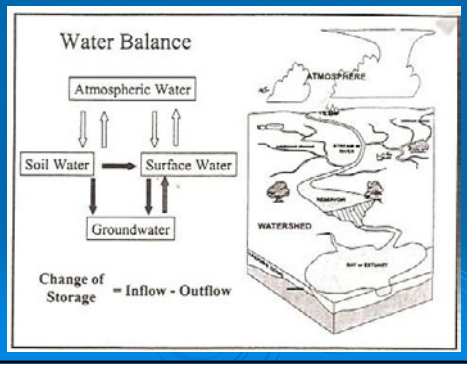
Rainfall Runoff Processes



Pathways followed by subsurface runoff on hillsides



Water Balance



What Physical factors affect runoff terms in the water balance?

- Climate
- Topography
- Soils
- Vegetation
- Land-use

Climate Factors

- Precipitation
  - --Seasonal
  - --Intermittency
  - --Form(Rain or Snow)
- Potential Evaporation
- Temperature

Topography

- Slope
- Aspect(Solar Radiation Potential Evaporation)
- Convergence
  - -Saturation and wetness index

Soils

- Infiltration capacity
- Drainable porosity
- Field Capacity
- Erodability

Vegetation

- Canopy conductance
- Density (leaf area index)
- Root depth, strength and density (inhibit erosion and landslides)

Land use

- Agriculture
  - -Irrigation withdrawals
  - -Erodability
  - -Infiltration capacity
  - -Pollution (manure, E coli, fertilizers)
- Urbanization
  - -Impervious areas
  - -Water withdrawals
  - -Stormwater drains / soak pits
  - -Pollution
    - >Wastewater Discharge
    - > Street Runoff

Other Considerations

- Snow and snow storage
- Spatial variability (elevation, temperature, orographic precipitation)
- Quick flow versus base flow

For a watershed you need to know

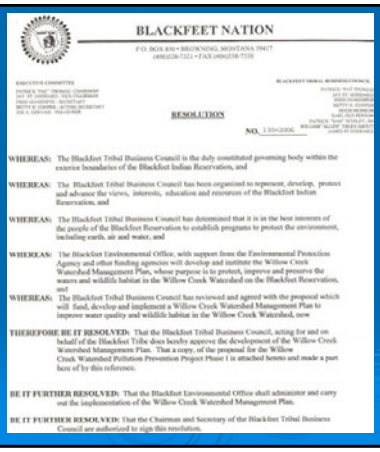
- Upstream water management
  -reservoirs and diversions
- Land use and how it may change
- Vegetation
- Soils
- Impervious areas
- Saturated areas (Topography)

Readings

- Dingman, S. L., (2002), Physical Hydrology, 2nd Edition, Prentice Hall, 646 p.
- Brutsaert, W., (2005) Hydrology : An Introduction, Cambridge University Press, 618 p.
- Dunne, T., and L.B. Leopold, (1978), Water in Environmental Planning, W H Freeman and Co, San Francisco, 818 p.
- Maidment, D.R.,ed. (2002) Arc Hydro Gis for Water Resources, ESRI Press, Redlands, Ca, 203 p.
- Tarboton, D.G., (20030, Rainfall Runoff Processes, Online Module and Workbook Prepared for the National Weather Service Comet Outreach Program, http://www.engineering.usu.edu./dtarb/rrp.html.
- Tarboton, D.G., (2005), "Terrain Analysis Using Digital Elevation Models (Taudem)," Utah Water Research Laboratory, Utah State University, May 2005, Http://www.engineering.usu.edu/dtarb.

Continued planning efforts for the willow creek water shed management plan

- Phase I: Establish the willow creek watershed protection team: A structure of committees and procedures for conducting the groups work.
- Blackfeet Tribal Resolution NO. 130-2006



BLACKFEET NATION

RESOLUTION

NO. 130-2006

WHEREAS: The Blackfeet Tribal Business Council is the duly constituted governing body within the exterior boundaries of the Blackfeet Indian Reservation, and

WHEREAS: The Blackfeet Tribal Business Council has been organized to represent, develop, protect and advance the views, interests, education and resources of the Blackfeet Indian Reservation, and

WHEREAS: The Blackfeet Tribal Business Council has determined that it is in the best interests of the people of the Blackfeet Reservation to establish programs to protect the environment, including earth, air and water, and

WHEREAS: The Blackfeet Environmental Office, with support from the Environmental Protection Agency and other funding agencies will develop and institute the Willow Creek Watershed Management Plan, whose purpose is to protect, improve and preserve the waters and wildlife habitat in the Willow Creek Watershed on the Blackfeet Reservation, and

WHEREAS: The Blackfeet Tribal Business Council has reviewed and agreed with the proposal which will fund, develop and implement a Willow Creek Watershed Management Plan to improve water quality and wildlife habitat in the Willow Creek Watershed, now

THEREFORE BE IT RESOLVED: That the Blackfeet Tribal Business Council, acting for and on behalf of the Blackfeet Tribe does hereby approve the development of the Willow Creek Watershed Management Plan. That a copy, of the proposal for the Willow Creek Watershed Pollution Prevention Project Phase I is attached hereto and made a part here of by this reference.

BE IT FURTHER RESOLVED: That the Blackfeet Environmental Office shall administer and carry out the implementation of the Willow Creek Watershed Management Plan.

BE IT FURTHER RESOLVED: That the Chairman and Secretary of the Blackfeet Tribal Business Council are authorized to sign this resolution.

ATTEST:

FRED GUARDIPEE, Secretary
Blackfeet Tribal Business Council

THE BLACKFEET TRIBE OF THE BLACKFEET INDIAN RESERVATION

PATRICK THOMAS, Chairman
Blackfeet Tribal Business Council

CERTIFICATION

I Hereby certify that the foregoing, Resolution was adopted by the Blackfeet Tribal Business Council during a duly called, noticed and convened Special session held on the 9th day of May, 2006, with SIX (6) members present to constitute a quorum and by a vote of SIX (6) FOR and ZERO (0) Opposed and ABSTAINING.

(seal)

FRED GUARDIPEE, secretary
Blackfeet Tribal Business Council

Phase II Identify problems and solutions

- Assess condition of the watershed to determine its health and problems facing the watershed, trends for future conditions, and priortize problems to be addressed.
- **Through existing water quality data, and existing reports and inventories.**
- Water Pollution Prevention Program (106 1994-96 water quality assessment report
- State Water Quality Assessment Report (305b)
- Blackfeet Tribal Water Quality Management Plan (208)
- Soil Survey of Glacier County
- Blackfeet Clean Lakes Program (314) Final Report
- 1995 Fish Shocking and Management Report for Lakes on Montana Indian Reservations
- Montana Nonpoint Assessment Report
- Blackfeet Nonpoint source assessment report
- Bureau of Indian Affairs Natural Resource Inventory and Production List
- U.S. Census Bureau (2002 Census)
- Assess existing management efforts to protect the watershed.

Advertise in local Newpaper, Radio stations, local TV stations and Schools.

Identify and engage people who have a stake in the watershed.

Landowners, residents, farmers, ranchers, local groups, gov. agencies, other organizations active in watershed, and local businessman.

Farm bureau, NRCS, Blackfeet Tribe, City Hall , EPA, Blackfeet Conservation District.

Establish your organization

- Executive Committee
- A planning team
- A technical advisory committee
- Action teams

Phase III Develop watershed management plan

- Detailed Strategies for actions to address problems of the watershed.
- Incorporate the nine elements into your watershed plan.

Phase IV Implement Watershed Management Plan

- Carry out actions
- Monitor watershed conditions
- Review progress
- Redirect priorties or efforts where appropriate

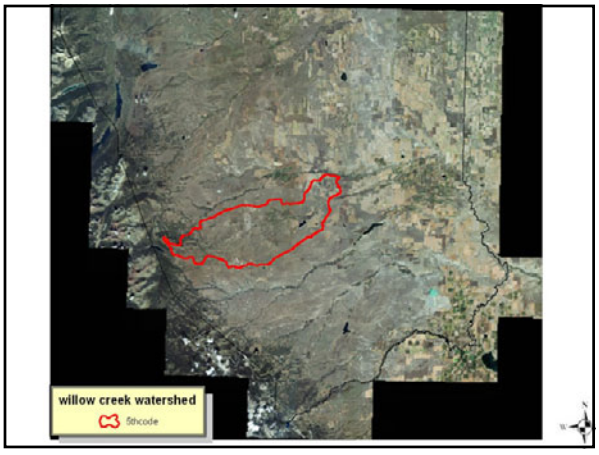
Project Description

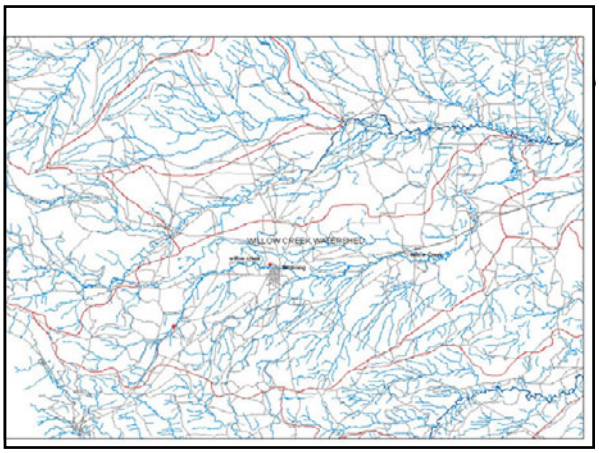
The WCWS is a subwatershed of Cutbank watershed. The watershed drains an area of 92,600 acres.

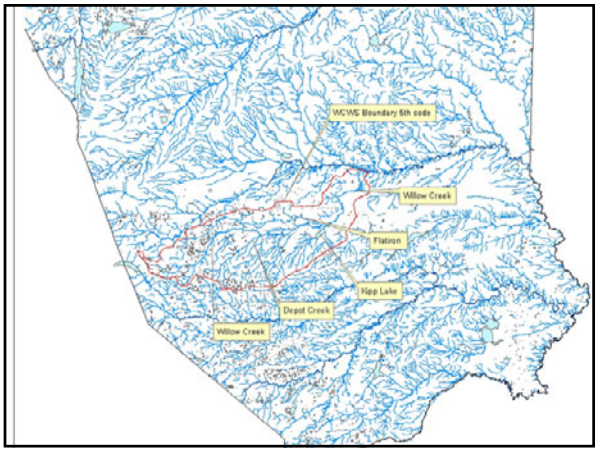
There is four sub- watershed within the willow creek watershed.

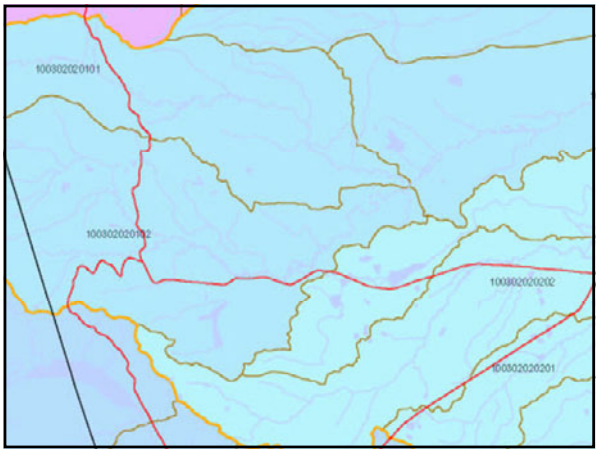
Hydrological Unit Codes: 100302020201, 100302020202,100302020203,100302020204

Water body	Miles of stream Acres of lakes Or groundwater	Pollutants or Cause of Impairment	Source Category	Source Subcategory	Specific Source	Severity	Method	Data source
Depot Creek	8 miles	Nutrients Coliform solidwaste	Agriculture Land disposal	Animal hold Wastewater Range	Browning sewer Lagoons Illegal dumping	M	E	208 management plan
Flatiron Creek	7 miles	Nutrients	Agriculture	Range	Grazing	M	E	Professional judgment
Kip lake	312 acres	Nutrients Pesticides	Agriculture	Range Crop production	Grazing Spraying	M	M	1993 clean Lakes Report
Willow Creek	25 miles	Nutrients Pesticides Sediment	Agriculture Urban runoff	Range Crp production Stream – surface Runoff	Grazing	S	M	1994-96 106 report 208 management plan




WILLOW CREEK WATERSHED


WCWS Boundary 5th code
Willow Creek
Flatiron
Kipp Lake
Depot Creek
Willow Creek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