

**USER'S MANUAL FOR THE BIGHORN CANYON
NATIONAL RECREATION AREA
BIBLIOGRAPHY**

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INTRODUCTION

The keystone upon which effective resources management decisions are formulated can be defined as the quantity and quality of readily available information. Given the current time and budgetary constraints confronting National Park Service resource managers, an expedient, reliable and consistent means of information storage and retrieval must be made available.

With financial support provided through the University of Wyoming - National Park Service Research Center, a natural resources database addressing these concerns has been generated for the Bighorn Canyon National Recreation Area. Termed the Bighorn Canyon National Recreation Area Bibliography (BCNRAB), the database can be defined as a comprehensive, computerized bibliographic storage and retrieval system consisting of Big Horn Basin natural resources information.

The BCNRAB was developed primarily to: save time, effort and expense in locating Big Horn Basin natural resources literature; reduce the possibility of future duplication of effort; aid in the identification of those Basin areas where possible data-gaps exist; and computerize Big Horn Basin bibliographic information to ensure rapid retrieval-updating capability.

Subject areas incorporated into the system include: water resources, fish and wildlife, range management, recreation, geology and numerous other disciplines associated with the natural resources of the Big Horn Basin. At present, the database contains over 6,000 citations which will hopefully grow as new information becomes available.

Bibliographic information incorporated into the BCNRAB was obtained from a variety of sources including federal and state agencies,

universities, city and county offices, libraries, consulting firms, commercial database searches, and environmental and special interest groups.

DATABASE STRUCTURE

The Bighorn Canyon National Recreation Area Bibliography is managed by a computer-based bibliographic storage and retrieval package called FAMULUS. The FAMULUS system was originally designed in the mid-1960's to process personal reference collections maintained by research scientists. Recent updates to the original FAMULUS package have provided extreme flexibility in storing, managing and retrieving bibliographic citations. Additional refinements include an increased FAMULUS storage capability to 99,999 individual citations, increased citation descriptive capacity of up to 1,650 words per citation, and more efficient FAMULUS access, data entry and editing capabilities. The FAMULUS system is currently fully operational on the University of Wyoming's Cyber computers.

CITATION FORMAT

Efficient data collection, documentation and computer-based management procedures required citation formatting standardization at the onset of this study. To adhere to FAMULUS guidelines and provide the NPS with an easily readable citation, the following "Field" structure was developed:

<u>FIELD</u>	<u>DEFINITION</u>
AUTH	Author of publication
SORT	Author rearrangement
YEAR	Year(s) of publication(s)
TITL	Complete title of publication
SRCE	Publisher
DESC	Descriptors or key words
LOCN	Physical location of document
GEOG	Geographic area encompassed by the report

In review of the above citation "Field" structure, the AUTH, SORT, YEAR, TITL, and SRCE "Fields" are basically self-explanatory and require no further elucidation. A more indepth description of the DESC, LOCN, and GEOG "Fields" is as follows:

DESC - Subject keywords used to identify the topic of the report.

Each citation has been assigned 3 to 4 keyword descriptors for enhanced citation retrieval capability. An alphabetized listing of all BCNRAB descriptors can be found in Appendix A.

LOCN - This field identifies the repository where a copy of the actual document may be obtained. The name of the agency, library or office will be listed first followed by the city in parentheses. Those cities which are outside of Wyoming will also have the state name listed.

GEOG - Identifies the specific Basin area addressed by a report.

Geographic information listed in this field includes: water division, county, major drainage basins, sub-basins and finally the particular stream, lake, city or town, canal, dam, etc. encompassed by the report. This field is particularly useful in restricting a "Search" to a specific geographic area of the Basin. A map of the Big Horn Basin Project area is presented in Appendix B.

INFORMATION RETRIEVAL

BCNRAB information retrieval is accomplished through utilization of one, a combination of several, or all of the citation formatting "Fields" previously presented. A "search" statement developed from these "Fields" can

then be designed to meet the specific needs of the user. Although all of the "Fields" can be searched, past experience indicates that most NPS requests will probably be filled using a combination of the author, year, title, subject descriptor, or geographic descriptor fields.

A basic search example would be one in which the user was looking for a report by a particular individual. The BCNRAB could then be searched by AUTH and any citation listing this person, as either the author or co-author, would be retrieved. Another example of a search would be if the user was interested in obtaining all database information concerning "fisheries". If the broad term "fisheries" was used in the search statement, all "fisheries" related information would be retrieved from the database. The user could also refer to the "Descriptor Index", found in Appendix A and narrow the search term to a more specific aspect of "fisheries"; for instance, one could use the subject heading "fish diseases". The search would then be restricted to locating those BCNRAB citations that pertain to "fish diseases".

Searching for citations can become even more site- and topic-specific by using a combination of fields; for instance, someone may require information concerning water quality in the Big Horn River within the confines of Washakie County, Wyoming, from the years 1980 to 1983. Conjunctive use of these parameters would retrieve references that meet all of the above criteria.

Following, on page 5, are examples of actual BCNRAB citations, listing two format options currently available to the user. In reviewing this information, one can imagine the various combinations of fields which could be used to retrieve these citations.

CONDUCTING A BCNRAB SEARCH

To provide the NPS with the greatest possible flexibility in conducting a BCNRAB Search, two techniques designed to enhance BCNRAB information retrieval have been developed. These procedures include:

A. Data Base Printout

Utilization of the BCNRAB database printout will preclude the necessity of having to conduct a computer search, thereby insuring maximum efficiency when attempting to rapidly locate desired Basin information. Each printout consists of three major sections formatted as follows:

1. Thesauri of Descriptors
2. Alphabetized Indices
3. Bibliography

The Thesauri of Descriptors consists of two alphabetized key-word lists; one pertaining to subject descriptors and the second to geographic descriptors. Every subject or geographic key word incorporated into the database is listed in one of these two thesauri of descriptors.

Three alphabetized indices, consisting of an Author Index, a Subject Index and a Geographic Index, are included to provide an expedient cross-referencing capability. Included with each database author, subject descriptor and geographic descriptor is a listing of all applicable BCNRAB citation numbers. The use of these indices in conjunction with the Bibliography will insure rapid location of those BCNRAB citations desired for review.

The final section contains the actual Bibliography. Arranged alphabetically by author, each citation is assigned a unique number located at the left of the citation. The user should normally begin with the alphabetized thesauri of descriptors, choose several key words, and

then locate these key words in the applicable indices, e.g. Author, Subject or Geographic Index. Under each index key word will be a list of BCNRAB citation numbers that can then be located in the actual Bibliographic printout.

B. Computer "Search" Procedures

Completion of the following five steps will enable a user to initiate an effective BCNRAB computer "Search":

1. What is the main topic of your search?

EX. Fish or Wildlife; Water Quality;
Hydrology; Energy Development

2. Pick 3 or 4 "Descriptors" from Appendix A that pertain to your main topic.

-
3. If your topic is confined to a specific geographic area within the Basin, use the map found in Appendix B to identify:

- a. County _____
- b. Major Drainage _____
- c. Town _____
- d. Stream, Lake, Dam, etc. _____

4. Additional information (e.g., Author(s), Year Range, Title of Report, etc.)

-
5. "X" one or more of the following "FIELDS" you desire to search.

AUTH _____
YEAR _____
TITL _____
SRCE _____
DISC _____
GEOG _____

Contact Terry Peters at the Bighorn Canyon National Recreation Area Visitors Center to have your "Search" conducted.

BCNRAB UPDATING ALTERNATIVES

The BCNRAB has been designed as a dynamic, growing system, one that should be periodically updated to keep it current. As new reports and documents are generated on the natural resources of the Big Horn Basin, it is important that this information be included on the database. To accomplish this task, the following alternatives are provided for NPS consideration:

A. Supplemental Big Horn Basin "Contact" List

A supplemental Big Horn Basin "Contact List" containing names and addresses of organizations and individuals, etc., conducting research within the Basin can be referenced to obtain newly generated Basin information.

B. Contact Cards

Distribution of self-addressed contact cards, requesting bibliographic information on newly generated reports to obtain update information.

C. Annual Visits for Update Information

Conduct annual visits to key agencies and groups who produce or collect a large number of Basin reports to obtain update information.

APPENDIX A
DESCRIPTOR INDEX

ABLATION
ABSORPTION
ABSTRACTS
ABUTMENTS
ACCESS ROADS
ACCIPITERS
ACCOUNTING SYSTEMS
ACID MINE DRAINAGE
ACID RAIN
ACIDIC WATER
ADAPTIVE STRATEGIES
ADJUDICATION PROCEDURES
ADMINISTRATION
ADMINISTRATIVE AGENCIES
ADMINISTRATIVE DECISIONS
ADMINISTRATIVE PROCEDURES
ADMINISTRATIVE REGULATIONS
ADSORPTION
AERATION
AERIAL PHOTOGRAPHY
AERIAL SURVEILLANCE
AESTHETICS
AFTERBAYS
AGING
AGRICULTURAL ENGINEERING
AGRICULTURAL HYDROLOGY
AGRICULTURAL RUNOFF
AGRICULTURAL WATER
AGRICULTURAL WATERSHEDS
AGRICULTURE
AGRONOMIC CROPS
AGRONOMY
AIR POLLUTION EFFECTS
AIR QUALITY
AIR TEMPERATURE
AIRCRAFT
AIRPORTS
ALKALI FLATS
ALBATION
ALFALFA
ALGAE
ALGAE CONTROL
ALGAL GROWTH
ALKALI FLATS
ALKALINE SOILS
ALKALINE WATER
ALKALINITY
ALLUVIAL CHANNELS
ALLUVIAL DEPOSITS
ALLUVIAL FANS
ALLUVIAL PLAINS
ALLUVIAL RIVERS
ALLUVIUM
ALPINE REGIONS
ALTERNATIVE ENERGY SOURCES
ALTERNATIVE PLANNING

ALTERNATIVE WATER USE
AMPHIBIANS
ANADROMOUS FISH
ANALYSIS
ANIMAL BEHAVIOR
ANIMAL POPULATIONS
ANISOTROPY
ANNUAL RUNOFF
ANTELOPE
ANTHRAX
ANTHROPOLOGY
ANTICLINES
ANTS
APPLICATION RATES
APPRAISALS
APPROPRIATIONS
AQUACULTURE
AQUATIC
AQUATIC ANIMALS
AQUATIC ENVIRONMENT
AQUATIC HABITATS
AQUATIC LIFE
AQUATIC PLANTS
AQUATIC POPULATIONS
AQUATIC PRODUCTIVITY
AQUATIC VEGETATION
AQUATIC WEED CONTROL
AQUEDUCTS
AQUIFER CHARACTERISTICS
AQUIFER MANAGEMENT
AQUIFER TESTING
AQUIFERS
ARCH DAMS
ARCHAEOLOGY
ARCTIC GRAYLING
ARID LANDS
ARSENIC
ARTEMISIA NOVA
ARTESIAN BASINS
ARTESIAN SPRINGS
ARTESIAN WATER
ARTESIAN WELLS
ARTIFICIAL PRECIPITATION
ASH
ASPHALT
ASPHALTIC CONCRETE
ASSESSMENTS
ATLAS
ATMOSPHERE
ATMOSPHERIC PHYSICS
ATMOSPHERIC WATER
ATOMIC ENERGY
ATTITUDES
AUTOMATION
AVAILABLE WATER
AVERAGE FLOWS

BACTERIA
BACTERIAL ANALYSIS
BADLANDS
BAITS
BALD EAGLES
BANDING
BANK STABILIZATION
BANKFULL STAGE
BARLEY
BAROMETRIC PRESSURE
BARRIERS
BASALTS
BASE FLOW
BASELINE STUDIES
BASINS
BASS
BEANS
BEARS
BEAVERS
BED LOAD
BEETS
BEHAVIOR
BEHAVIORAL STUDIES
BENCH FLUMES
BENEFICIAL USE
BENTHIC FAUNA
BENTHOS
BENTONITE
BENTONITIC MATERIALS
BIBLIOGRAPHIES
BIG GAME
BIG SAGEBRUSH
BIGHORN SHEEP
BIOCHEMISTRY
BIOINDICATORS
BIOLOGICAL PROPERTIES
BIOLOGY
BIOMASS
BIRDS
BISON
BISON DRIVES
BLACK BEARS
BLACK CRAPPIES
BLACK FOOTED FERRETS
BLACK ROSY FINCH
BLIND
BLOWING SNOW
BLUE GROUSE
BLUEBUNCH WHEATGRASS
BLUEGILLS
BOAT LAUNCHING RAMPS
BOATING
BOBCATS
BOGS
BOND ISSUES
BOREHOLE GEOPHYSICS

BRAIDED STREAMS
BREEDING
BREEDING GROUNDS
BRIDGE CONSTRUCTION
BRIDGES
BROOK TROUT
BROWN TROUT
BROWSE
BUDGETING
BUFFALO JUMPS
BUFFALO POUNDS
BUILDING CODES
BUILDINGS
BULLHEAD
BUNTINGS
BURBOT
BURNING
BUTEOS
BUTTRESS DAMS
CALCIUM
CALCIUM SULFATE
CAMBRIAN
CAMOUFLAGE WIRE
CAMPING
CAMPSITE SELECTION
CANADIAN GEESE
CANAL CONSTRUCTION
CANAL DESIGN
CANAL LININGS
CANALS
CAPACITY
CAPITAL
CARBONATES
CARP
CARPSUCKERS
CASE STUDIES
CATCHMENT AREAS
CATFISH
CATION EXCHANGE
CATIONS
CATTLE
CAVERN FLOW
CAVES
CENOZOIC ERA
CENSUS
CHANNEL ALTERATION
CHANNEL CATFISH
CHANNEL EROSION
CHANNEL FLOW
CHANNEL IMPROVEMENT
CHANNEL MORPHOLOGY
CHANNELING
CHANNELS
CHARTS
CHENCONTROL
CHEMICAL ANALYSIS

CHEMICAL COMPOSITION
CHEMICAL DEGRADATION
CHEMICAL PROPERTIES
CHEMICAL REACTIONS
CHEMISTRY
CHEMISTRY OF PRECIPITATION
CHLORIDES
CHROMATOGRAPHY ANALYSIS
CHRONOLITHOFACIES
CHRONOLOGY
CHUBS
CHUKARS
CIVIL DEFENSE
CIVIL ENGINEERING
CIVIL LAW
CLASSIFICATION
CLAYS
CLEAR-CUTTING
CLIMATES
CLIMATIC CHANGE
CLIMATIC DATA
CLIMATIC ZONES
CLIMATOLOGY
CLOUD COVER
CLOUD SEEDING
CLOUDS
COAGULATION
COAL
COAL GASIFICATION
COAL MINES
COAL MINING
COAL SLURRIES
COD
COLIFORMS
COMMERCIAL FISHERIES
COMMERCIAL FISHING
COMMUNITY DEVELOPMENT
COMPARISON STUDIES
COMPETING USES
COMPREHENSIVE PLANNING
COMPUTER MAPPING
COMPUTER MODELS
COMPUTER PROGRAMS
COMPUTERS
CONCRETE CONSTRUCTION
CONCRETE DAMS
CONCRETE TESTING
CONDITION
CONDUCTIVITY
CONDUITS
CONFERENCES
CONFINED AQUIFERS
CONFINED GROUNDWATER
CONIFEROUS FORESTS
CONIFERS
CONJUNCTIVE USE

CONSERVATION
CONSERVATION DISTRICTS
CONSERVATION STORAGE
CONSTITUTIONAL LAW
CONSTRUCTION
CONSTRUCTION MATERIALS
CONSTRUCTION METHODS
CONSTRUCTION STANDARDS
CONSUMPTIVE USE
CONTAMINATION
CONTOUR MAPS
CONTRACTS
CONTROL
CONTROL SYSTEMS
CONVEYANCE STRUCTURES
COOLING
COOLING PONDS
COOPERATIVES
COPPER
CORE DRILLING
CORN
CORRELATION ANALYSIS
COST ALLOCATION
COST ANALYSIS
COST-BENEFIT ANALYSIS
COST BENEFIT ANALYSIS
COST REPAYMENT
COSTS
COTTONTAIL RABBITS
COVER CROPS
COYOTES
CHAPPIES
CRAYFISH
CREEK CHUBS
CREEL
CREEL CENSUS
CRETACEOUS FORMATIONS
CRITICAL DEPTH
CRITICAL HABITATS
CROP DEPREDAATION
CROP PRODUCTION
CROP YIELD
CROPLANDS
CROW TRIBE
CRUSTACEANS
CRYSTALS
CULTIVATED LANDS
CULTIVATION
CULTURAL ANTHROPOLOGY
CULTURAL PRESERVATION
CULTURAL RESOURCES
CULVERTS
CURRENT METERS
CUTTHROAT TROUT
CUTTING MANAGEMENT
DACE

DAM CONSTRUCTION
DAM DESIGN
DAM FAILURE
DAM FOUNDATIONS
DAM STABILITY
DAMAGE
DAMAGE COSTS
DAMS
DAMSITES
DATA COLLECTIONS
DATA PROCESSING
DATA STORAGE AND RETRIEVAL
DEBTS
DECISION MAKING
DEEP-WATER HABITATS
DEEP WELLS
DEER
DEGRADATION
DELTA FORMATION
DELTAS
DENSITY
DEPLETION
DEPOSITION
DEPTH-AREA-DURATION ANALYSIS
DESALINATION
DESIGN
DESIGN CRITERIA
DESIGN DATA
DESIGN STANDARDS
DETECTION LIMITS
DETENTION DAMS
DEVELOPMENT
DEWATERING
DEWPOINT
DIATRYMA
DIETS
DIGITAL COMPUTERS
DIKES
DIRECTORIES
DISASTERS
DISCHARGE CAPACITY
DISCHARGE HYDROGRAPHS
DISCHARGE MEASUREMENTS
DISEASES
DISSOLVED OXYGEN
DISSOLVED SOLIDS
DISTILLATION
DISTRIBUTION
DISTRIBUTION STUDIES
DITCHES
DIVERSION DAMS
DIVERSION DITCHES
DIVERSION LOSSES
DIVERSION STRUCTURES
DIVERSIONS
DOCUMENTATION

DOLOMITE
DOMESTIC ANIMALS
DOMESTIC WASTES
DOMESTIC WATER
DOUBLE-CRESTED CORMORANTS
DRAINAGE
DRAINAGE AREAS
DRAINAGE BASINS
DRAINAGE DISTRICTS
DRAINAGE ENGINEERING
DRAINAGE PATTERNS
DRAINAGE PROGRAMS
DRAINAGE SYSTEMS
DRAINS
DRIFTING SNOW
DRILL HOLES
DRILLING
DRINKING WATER
DRIP IRRIGATION
DROUGHT MANAGEMENT
DRY FARMING
DUCKS
DUDE RANCHES
DUNCAN POINTS
DYE RELEASES
EAGLES
EARTH DAMS
EARTHQUAKES
EARTHWORKS
ECOLOGICAL STUDIES
ECOLOGY
ECONOMIC ASPECTS
ECONOMIC DEVELOPMENT
ECONOMIC EFFICIENCY
ECONOMIC EVALUATION
ECONOMIC FEASIBILITY
ECONOMIC GROWTH
ECONOMIC IMPACT
ECONOMIC JUSTIFICATION
ECONOMICS
ECOSYSTEMS
ECOTYPES
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EFFLUENT STREAMS
EFFLUENTS
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ELECTRIC POWER PRODUCTION
ELECTRIC POWER
ELECTRIC POWER DEMAND
ELECTRIC POWER INDUSTRY
ELECTRIC POWER PRODUCTION
ELECTRIC POWERPLANTS
ELECTRICAL EQUIPMENT
ELECTRICAL NETWORKS
ELECTRICAL STUDIES
ELECTRICAL TRANSMISSION

ELECTRICAL WELL LOGGING
ELECTROFISHING
ELEVATION
ELK
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EMINENT DOMAIN
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ENERGY
ENERGY CONSERVATION
ENERGY CONSUMPTION
ENERGY CONVERSION
ENERGY DEVELOPMENT
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ENVIRONMENTAL ASSESSMENTS
ENVIRONMENTAL CONTROL
ENVIRONMENTAL EDUCATION
ENVIRONMENTAL EFFECTS
ENVIRONMENTAL GRADIENT
ENVIRONMENTAL IMPACT STATEMENT
ENVIRONMENTAL POLICY
ENVIRONMENTAL PROTECTION
ENVIRONMENTAL QUALITY
ENVIRONMENTAL SANITATION
EPHEMERAL STREAMS
EPIZOOTIC
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EROSION CONTROL
EROSION RATES
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EVAPORATION RATES
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EXCLOSURES
EXOTIC SPECIES
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EXPENDITURES
EXPERIMENTAL BASINS
EXPERIMENTAL FARMS
EXPLORATION

EXPORT
EXTINCT SPECIES
FABRICATION
FACILITIES
FACTOR ANALYSIS
FALCONS
FALLOUT
FAMILY SPORTS
FARM LOANS
FARM MANAGEMENT
FARM PONDS
FARMING
FARMS
FATHEAD MINNOWS
FAULTS
FAUNA
FEASIBILITY STUDIES
FEDERAL AID
FEDERAL JURISDICTION
FEDERAL WATER POLLUTION CONTROL ACT
FELDSPARS
FENCES
FERTILIZATION
FERTILIZERS
FIELD TESTS
FILMS
FILTERS
FILTRATION
FINANCIAL FEASIBILITY
FINANCING
FINITE DIFFERENCE METHODS
FIR TREES
FIRE CONTROL PLANS
FISH
FISH BARRIERS
FISH BEHAVIOR
FISH CONSERVATION
FISH CONTROL AGENTS
FISH CULTURE
FISH DIETS
FISH DISEASES
FISH EGGS
FISH ESTABLISHMENT
FISH FARMING
FISH HANDLING FACILITIES
FISH HARVEST
FISH HARVESTS
FISH HATCHERIES
FISH MANAGEMENT
FISH PHYSIOLOGY
FISH PONDS
FISH POPULATIONS
FISH REPRODUCTION
FISH SPECIES NOT AVAILABLE
FISH STOCKING
FISH TOXINS

FISHERIES
FISHING
FISHING GEAR
FISHKILL
FLATHEAD CHUBS
FLOOD BASINS
FLOOD CONTROL
FLOOD CONTROL STORAGE
FLOOD CREST
FLOOD DAMAGE
FLOOD DATA
FLOOD FLOW
FLOOD FORECASTING
FLOOD FREQUENCY
FLOOD INSURANCE
FLOOD PEAK
FLOOD PLAIN MANAGEMENT
FLOOD PLAIN ZONING
FLOOD PLAINS
FLOOD PROTECTION
FLOOD WATER
FLOODING
FLOODS
FLOODWATER
FLORA
FLOW
FLOW CHARACTERISTICS
FLOW DISCHARGE
FLOW DURATION
FLOW MEASUREMENTS
FLOW NETS
FLOW PATTERNS
FLOW RATES
FLOWING WELLS
FLUMES
FLUORESCENCE
FLUORIDES
FLUSHING FLOW
FLUVIAL SEDIMENTS
FOOD HABITS
FORAGE
FORAGE UTILIZATION
FORAMINIFERA
FORBS
FORECASTING
FOREST FIRES
FOREST GROUSE
FOREST HYDROLOGY
FOREST MANAGEMENT
FOREST WATERSHEDS
FORESTRY
FORESTS
FOSSILS
FRACTURE PERMEABILITY
FREEZING
FREQUENCY ANALYSIS

FREQUENCY DISTRIBUTION
FRONTIER
FROST
FROZEN GROUND
FUEL
FUEL ENERGY SOURCES
FUEL PROCESSING
FUELS
FURBEARING SPECIES
FURROW IRRIGATION
FUTURE PLANNING
GAGING STATIONS
GAME BIRDS
GAME FARMS
GAS
GAS CHROMATOGRAPHY
GEOCHEMISTRY
GEOGRAPHY
GEOHYDROLOGIC BOUNDARIES
GEOHYDROLOGY
GEOLOGIC FAULTS
GEOLOGIC FORMATIONS
GEOLOGIC FRACTURES
GEOLOGIC HISTORY
GEOLOGIC INVESTIGATIONS
GEOLOGIC MAPPING
GEOLOGIC TIME
GEOLOGIC UNITS
GEOLOGICAL SURVEYS
GEOLOGY
GEOMORPHOLOGY
GEOPHYSICS
GEOTHERMAL POWER
GEOTHERMAL RESOURCES
GEOTHERMAL STUDIES
GEYSERS
GLACIAL LAKES
GLACIAL STREAMS
GLACIATION
GLACIERS
GLACIOHYDROLOGY
GLASS SANDS
GOATS
GOLD
GOLD PLACERS
GOLDBOW TROUT
GOLDEN EAGLES
GOLDEN TROUT
GOVERNMENT FINANCE
GOVERNMENT SUPPORTS
GOVERNMENTAL INTERRELATIONS
GRAIN CHOPS
GRANTS
GRASSES
GRASSHOPPERS
GRASSLANDS

GRAVEL	HEAT FLOW	HYDROTHOL 191
GRAVITY DAMS	HEAT TRANSFER	HYGROSCOPIC WATER
GRAVITY STATIONS	HEAVY METALS	ICE
GRAYLING	HERBAGE	ICE BREAKUP
GRAZING	HERBICIDES	ICE COVER
GREASEWOOD	HERD COMPOSITION	ICE FORMATION
GREEN SUNFISH	HERD UNIT OVERLAYS	ICE-WATER INTERFACES
GREENHOUSES	HERD UNITS	IDaho FESCUE
GRIZZLY BEARS	HIDATSA TRIBE	IMPACT ASSESSMENTS
GROUNDWATER	HIGH FLOW	IMPORTED WATER
GROUNDWATER AVAILABILITY	HIGHWAY CONSTRUCTION	IN SITU TESTS
GROUNDWATER BASINS	HIGHWAYS	INCOME
GROUNDWATER BUDGET	HIKING	INCOME DISTRIBUTION
GROUNDWATER DEPLETION	HISTORIC SITES	INDEXING
GROUNDWATER DEVELOPMENT	HISTORIC STRUCTURES	INDIAN CULTURE
GROUNDWATER DISCHARGE	HISTORY	INDIAN LANDS
GROUNDWATER HYDROLOGY	HOMES	INDIAN MIGRATION
GROUNDWATER IRRIGATION	HORNED LARKS	INDIAN VILLAGES
GROUNDWATER LEVELS	HOT SPRINGS	INDIAN WARS
GROUNDWATER MANAGEMENT	HOUSING	INDUSTRIAL DEVELOPMENT
GROUNDWATER MOVEMENT	HUMAN POPULATION	INDUSTRIAL PLANTS
GROUNDWATER POLLUTION	HUMIDITY	INDUSTRIAL PRODUCTION
GROUNDWATER POTENTIAL	HUNGARIAN PARTRIDGE	INDUSTRIAL WASTES
GROUNDWATER RECESSON	HUNTING	INDUSTRIAL WASTEWATER
GROUNDWATER RECHARGE	HYBRID TROUT	INDUSTRIAL WATER
GROUNDWATER RESERVOIRS	HYDRAULIC CONDUCTIVITY	INDUSTRY
GROUNDWATER RESOURCES	HYDRAULIC DESIGN	INFILTRATION
GROUNDWATER STORAGE	HYDRAULIC GRADIENT	INFILTRMETERS
GROUTING	HYDRAULIC MODELS	INFORMATION EXCHANGE
GROWTH	HYDRAULIC PROFILES	INFORMATION RETRIEVAL
GROWTH CHAMBERS	HYDRAULIC PROPERTIES	INFORMATION SYSTEMS
GROWTH RATES	HYDRAULIC SYSTEMS	INFRARED IMAGERY
GUIDELINES	HYDRAULIC TURBINES	INFRARED RADIATION
GYP SUM	HYDROCARBONS	INFRARED SPECTROSCOPY
HABITAT AFFINITY	HYDRODYNAMICS	INHIBITORS
HABITAT LOSS	HYDROELECTRIC PLANTS	INJECTION
HABITAT MANAGEMENT	HYDROELECTRIC POWER	INPUT-OUTPUT ANALYSIS
HABITAT QUALITY INDEX	HYDROGEN ION CONCENTRATION	INSECT CONTROL
HABITATS	HYDROGRAPHY	INSECTICIDES
HA IL	HYDROLOGIC ASPECTS	INSECTS
HALOGETON	HYDROLOGIC ATLASES	INSPECTIONS
HANDBOOKS	HYDROLOGIC BUDGET	INSTITUTIONAL CONSTRAINTS
HANDICAPPED SERVICES	HYDROLOGIC CYCLE	INSTREAM FLOW
HANNA POINTS	HYDROLOGIC DATA	INTERAGENCY COOPERATION
HARASSMENT	HYDROLOGIC DATA COLLECTIONS	INTERBASIN TRANSFERS
HARDPAN SOILS	HYDROLOGIC ENGINEERING	INTERCEPTION
HARVEST REPORTS	HYDROLOGIC MAPS	INTERFACES
HARVESTER ANTS	HYDROLOGIC MODELS	INTERMITTENT STREAMS
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HAZARDS	HYDROLOGICAL REGIME	INTERSTATE COMPACTS
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HEADWATERS	HYDROMETEOROLOGY	INTERSTATE WATERS
HEAT	HYDROSTATIC PRESSURE	INVENTORIES
HEAT BUDGET	HYDROTHERMAL STUDIES	INVERTEBRATES

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NO FISH SPECIES PRESENT-POLLUTION
NO FISH SPECIES PRESENT-TOO REMOTE
NO FISH SPECIES PRESENT-TOO SHALLOW
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NON-FUEL MINERALS
NON-GAME BIRD SPECIES
NON-GAME FISH SPECIES
NON-RESIDENT USERS
NONPOINT POLLUTION SOURCES
NONUNIFORM FLOW

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PELLET TRANSECTS
PENSTOCKS
PERCH
PERCOLATION
PEREGRINE FALCONS
PERENNIAL GRASSES
PERENNIAL STREAMS
PERIODIC SPRINGS
PERMEABILITY
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PHYSICAL PROPERTIES
PHYSICALLY HANDICAPPED
PHYSIOCHEMICAL PROPERTIES
PHYSIOGRAPHIC PROVINCES
PHYTOPLANKTON
PICNICKING
PIERS
PINE TREES
PIONEERS
PIPELINES
PLAINS KILLFISH
PLANKTON
PLANNING
PLANT CARE
PLANT GROWTH
PLANT MORPHOLOGY
PLANT PHYSIOLOGY
PLANT POPULATIONS
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PLASTIC PIPES
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RADIOLOGICAL TISSUE ANALYSIS
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RAINBOW TROUT
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RAINFALL DISTRIBUTION
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RESERVOIR SITING
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RESOURCES DEVELOPMENT
RESOURCES MANAGEMENT
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RIPARIAN HABITATS
RIPARIAN VEGETATION
RIPARIAN WATERS
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RIVER BASIN MANAGEMENT
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ROTATION GRAZING
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RUNOFF RATES
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SAGEBRUSH CONTROL
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SALINE SOILS
SALINE WATER
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SEDIMENT EROSION
SEDIMENT LOAD
SEDIMENT TRANSPORT
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SHEAR STRESS
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SHELTER BELTS
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SHRUBLANDS
SHRUBS
SILT
SILT LOAD
SILTING
SILVER SALMON
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SLURRIES
SMALL GAME
SMALL MAMMALS
SMALL WATERSHEDS
SNOW
SNOW ACCUMULATION
SNOW COURSES
SNOW COVER
SNOW MANAGEMENT
SNOW PRECIPITATION
SNOW SAMPLING
SNOW SKIING
SNOW SURVEYS
SNOW TRAPS
SNOWDRIFT
SNOWMELT
SNOWMOBILING
SNOWPACK
SNOWSHOE HARES
SOCIAL ASPECTS
SOCIAL CHANGE
SOCIAL IMPACTS
SOCIAL NEEDS
SOCIAL VALUES
SOCIOLOGY
SODIUM

SODIUM CHLORIDE
SODIUM SULFATE
SOIL ABSORPTION CAPACITY
SOIL ADSORPTION CAPACITY
SOIL ANALYSIS
SOIL CHEMISTRY
SOIL CLASSIFICATION
SOIL COMPACTION
SOIL CONSERVATION
SOIL ENVIRONMENT
SOIL EROSION
SOIL FUNGI
SOIL MANAGEMENT
SOIL MECHANICS
SOIL MOISTURE RETENTION
SOIL PHYSICS
SOIL PROPERTIES
SOIL SATURATION
SOIL SEALANTS
SOIL STABILITY
SOIL STABILIZATION
SOIL SURVEYS
SOIL TEMPERATURE
SOIL TESTS
SOIL TREATMENT
SOIL TYPES
SOIL WATER
SOIL-WATER-PLANT RELATIONSHIPS
SOIL WATER POTENTIAL
SOIL WATER TABLE
SOILS
SOLAR POWER
SOLAR RADIATION
SOLAR WATER HEATING
SOLID WASTE
SOVEREIGN IMMUNITY
SPATIAL DISTRIBUTION
SPAWNING
SPAWNING AREAS
SPAWNING CHANNEL
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SPECIES RESTORATION
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SPECKLED DACE
SPECTRAL ANALYSIS
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SPLAKE TROUT
SPOIL BANKS
SPORT FISHING
SPORTS
SPRAYING
SPRING PRODUCTIVITY

SPRINGS	SUBLIMATION	THERMODYNAMICS
SPRINKLER IRRIGATION	SUBSTRATES	THESAURI
SPRINKLERS	SUBSURFACE MAPPING	TIDAL EFFECTS
SPRUCE TREES	SUBSURFACE WATER	TIDES
SQUIRRELS	SUCCESSION	TIMBER HARVESTS
STABILIZATION PONDS	SUCKERS	TIMBER MANAGEMENT
STABLE CHANNELS	SULFATES	TIME-LAPSE PHOTOGRAPHY
STAGE-DISCHARGE RELATIONS	SULFIDES	TIPPI RINGS
STANDARDS	SULFUR	TISSUE ANALYSIS
STATE JURISDICTION	SULFURIC ACID	TOPOGRAPHIC MAPS
STATE LANDS	SUMMER RANGE	TOPOGRAPHY
STATE PARKS	SURFACE-GROUNDWATER RELATIONS	TOURISM
STATISTICAL ANALYSIS	SURFACE IRRIGATION	TOXICITY
STATISTICAL METHODS	SURFACE MINES	TOXICOLOGY
STATISTICS	SURFACE MINING	TRACE ELEMENTS
STATUTES	SURFACE RUNOFF	TRACE METALS
STEAM	SURFACE WATER	TRACERS
STEEL INDUSTRY	SURFACE WATER AVAILABILITY	TRACKING TECHNIQUES
STILLING BASINS	SURFACE WATER RECORDS	TRAFFIC
STOCK PONDS	SURVEYS	TRAILS
STOCKING	SUSPENDED LOADS	TRAINING
STOMATA	SUSPENDED SOLIDS	TRANSPORTATION
STONECAT	SWAMPS	TRANSMISSION FACILITIES
STORAGE CAPACITY	SWIMMING POOLS	TRANSMISSION LINES
STORAGE RESERVOIRS	SYMPOSIUM	TRANSPIRATION
STORM RUNOFF	SYNTHESIS	TRANSPLANTING
STORM SEWERS	SYNTHETIC FUELS	TRANSPORTATION
STORM WATER	SYNTHETIC HYDROLOGY	TRAPPING
STRATIGRAPHY	SYSTEMS ANALYSIS	TRAVEL
STRAW	TACONITE	TREATED WATER
STREAM BANKS	TAGGING	TREATIES
STREAM BIOTA	TAILINGS	TREES
STREAM CLASSIFICATION	TAILRACE	TRIBUTARIES
STREAM DEGRADATION	TAILWATER	TROMA
STREAM DISCHARGE	TAXES	TROUT
STREAM EROSION	TECHNICAL WRITING	TRUMPETER SWANS
STREAM FISHERIES	TECHNOLOGY	TUNNEL CONSTRUCTION
STREAM FISHERIES	TECHNOLOGY TRANSFER	TUNNELS
STREAM GAGES	TECTONICS	TURBIDITY
STREAM IMPROVEMENT	TEETH	TURBIDITY CURRENTS
STREAM POLLUTION	TELEMETRY	TURKEYS
STREAM STABILIZATION	TEMPERATURE	UNDERFLOW
STREAMBEDS	TEMPERATURE DISTRIBUTION	UNDERGROUND STREAMS
STREAMFLOW	TEMPERATURE GRADIENT	UNDERGROUND WATER
STREAMFLOW FORECASTING	TEMPORAL DISTRIBUTION	UNDEVELOPED AREAS
STREAMS	TERRESTRIAL	UPLAND GAME
STRESS ANALYSIS	TERTIARY INTRUSIVE ROCKS	UPLAND GAME BIRDS
STRIP MINE WASTES	TEST FACILITIES	URANIUM
STRIP MINES	TESTING PROCEDURES	URANIUM MILLING
STRIPED BASS	THERMAL POLLUTION	URANIUM MINING
STRUCTURAL GEOLOGY	THERMAL POWER	URBAN AREAS
STRUCTURE	THERMAL POWERPLANTS	URBAN DEVELOPMENT
STRUTTING GROUNDS	THERMAL SPRINGS	URBAN HYDROLOGY
SUBALPINE FORESTS	THERMAL STRESS	URBAN PLANNING
SUBALPINE RANGE	THERMAL WATER	VALLEYS
SUBDIVISIONS	THERMAL WATERS	VAPORIZATION

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 VEGETATION
 VEGETATION CONTROL
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 VISITATION ANALYSIS
 VISITOR CENTERS
 VISITOR SERVICES
 VOLCANIC ROCKS
 VOLCANOES
 WALKWAYS
 WALLEYES
 WALLS
 WARM SPRINGS
 WASTE CHARACTERISTICS
 WASTE DISPOSAL
 WASTE MANAGEMENT
 WASTEWATER
 WASTEWATER ANALYSIS
 WASTEWATER DISPOSAL
 WASTEWATER FACILITIES
 WASTEWATER LAGOONS
 WASTEWATER MANAGEMENT
 WASTEWATER TREATMENT
 WASTEWATER TREATMENT FACILITIES
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 WATER ALLOCATION
 WATER ANALYSIS
 WATER AVAILABILITY
 WATER BLEEDING
 WATER CONSERVATION
 WATER CONSUMPTION
 WATER CONTROL
 WATER CONVEYANCE
 WATER COSTS
 WATER DELIVERY
 WATER DEMAND
 WATER DEPTH
 WATER DEVELOPMENT
 WATER DISTRIBUTION
 WATER DISTRICTS
 WATER EXCHANGE
 WATER EXTENSIONS UNIT
 WATER FACILITIES
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 WATER LAW
 WATER LEVEL FLUCTUATIONS
 WATER LEVELS
 WATER LINES
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 WATER MANAGEMENT
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 WATER METERING

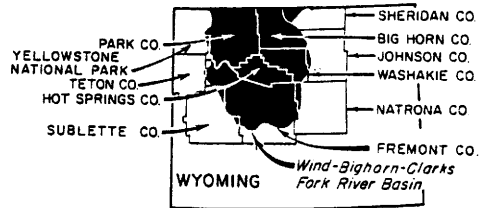
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 WATER POTENTIALS
 WATER PROPERTIES
 WATER QUALITY
 WATER QUALITY CONTROL
 WATER QUALITY CRITERIA
 WATER QUALITY MANAGEMENT
 WATER QUALITY STANDARDS
 WATER QUANTITY
 WATER RATES
 WATER RECORDS
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 WATER TRANSPORT
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 WATER TREATMENT FACILITIES
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 WATER VAPOR
 WATER WELLS
 WATER WORKS
 WATER YIELD
 WATER YIELD IMPROVEMENT
 WATERFOWL

WATERSHED DEVELOPMENT
 WATERSHED HYDROLOGY
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 WELL REGULATIONS
 WELL SEEPAGE
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 WELL YIELD
 WELLS
 WESTERN WHEATGRASS
 WETLANDS
 WHEAT
 WHEATGRASSES
 WHITE SUCKERS
 WHITE-TAILED DEER
 WHITE-TAILED PTARMIGAN
 WHITEFISH
 WICKIUP SITES
 WILD HORSES
 WILD RIVERS
 WILD TURKEYS
 WILDERNESS AREAS
 WILDLANDS
 WILDLIFE
 WILDLIFE ALLOWANCES
 WILDLIFE CONSERVATION
 WILDLIFE HABITATS
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 WILDLIFE MANAGEMENT
 WILLOW TREES
 WIND
 WIND EROSION
 WIND VELOCITY
 WINDBREAKS
 WINTER
 WINTER RANGE
 WINTER SPORTS
 WITHDRAWAL
 WOLVES
 WOODY PLANTS
 YELLOW PERCH
 YELLOWSTONE CUTTHROAT TROUT
 YIELDS

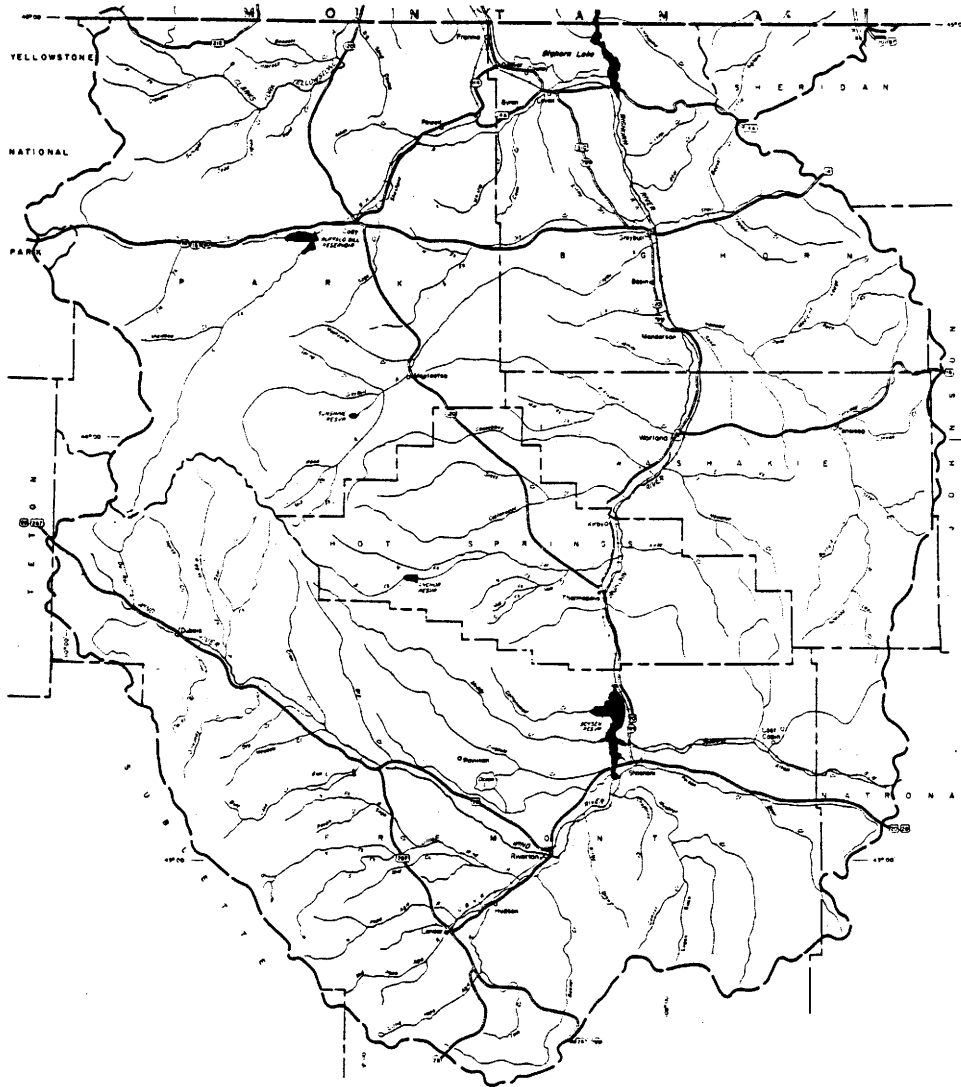
ZEOLITES
ZONING
ZOOPLANKTON
201 PLANS

APPENDIX B

BIG HORN BASIN MAP



LOCATION MAP



PROJECT MAP
BIGHORN RIVER BASIN
WYOMING
 1974
 WYOMING WATER RESEARCH CENTER

10 0 10 20 30 40 MILES
 SCALE 1:2,000,000

ALBERS EQUAL AREA PROJECTION

BIGHORN CANYON NATIONAL RECREATION

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