

WEATHER AND WATER INFORMATION

007.117

Library Call No. 007.117

0	Year	Title of Newspaper Article	x	Key Words
---	------	----------------------------	---	-----------

0 - First Column is for the assigned newspaper article numbered in red

Year - Articles are all sorted by year

Title of Newspaper Article – Name of article

x – Separator between columns

Key Words – Key words in article

0	Year	Title of Newspaper Article	X Key Words
1	August 7, 1959	Storm Supplies Additional Data for Flood Control Plans	X Mud Water, Debris, County, City, Salt River Project Engineers, Handle Floods, Coming From, How Best to Control, Future, Storm, Thunderstorm, Infrequently, Arizona, Weather Bureau, Sunnyslope, Cave Creek Dam, 37th Street and Osborn, Water Fell Rapidly, Downpour, Paul F. Glendenning, County Engineer, Storm Recorded, Phoenix, 4.98 Inches, July 1-2, 1911, Flood Control Work, Maricopa County Board of Supervisors, County Flood Control District, Floodwaters, 35th Avenue, 16th Street, Filled, Bridge, Black Canyon Highway, Bell Road, Overflowed Highway, Dreamy Draw, 5 Feet Deep, 16th Street, Arizona Canal, Broke, Dump Floodwater
2	August 7, 1959	The Rains Will Come Again	X House, Dreamy Draw, Storm, Filled-in Wash, Northern Ave., Tree Trunks, Old Automobiles, Front Yards, Homes, Bridges, Ice Jam, Cloudburst, Never Camp in a Wash, Never Build in a Basin, Fill in Basins, Dig Out Washes Again, Leveled Washes, Foothill Slopes, No Drainage Way, Mountains, Runoff, Fan Out, Mud, Debris, Artificial Flats, Channels, Newly Created County Flood Control District, Planning and Zoning Commission, Respect, Desert Washes, Adequate Compensating Drainage Way Installed
3	January 14, 1960	Under the Sun - Wet Cycle Revives Dam-Filling Contest	X Old Pioneer, Rain, Arizona, Disaster of Drought, Spring Flood, Salt River, Flow, Spillways, Theodore Roosevelt Dam, Alaska, Ice Jam, Tanana River, Chamber of Commerce, Tourist Trade, Farmers, Reservoirs, Filled, Louis Jurwitz, Weatherman, Snowpack, High Mountains, Soaked Ground, Wet Snow, Continuing Storm Conditions, 1953, Good Winter Rains, Stored Water, Abundant Rains in 1952, Mrs. L.G. Chalke, Casa Grande, Overflow Comes, Wet Years ('45, '49, '52, '53) Maximum Storage, Salt River Project Reservoirs, Heaviest Flow, Recorded History, Down Salt River, Tonto Creek, Verde River Was in 1905, Runoff, Runoffs Recorded: 1890, 1891, 1907, 1915, 1916, 1919, 1920, 1932, 1941, Wet Winter 1952 Runoff, Prize, Chrome-plated Bailing Bucket, Flooded Homes, Lehi, Buckeye, River Channel, Filled With Trees, Brush, Adjacent Lands, Inundated, Low Riverbed, Danger Zone
4	September 23, 1961	Irrigation Efficiency 100% - Edward Pratt Uses Irrigation To Get Penetration, Improve Yields, Save Water	X Edward Pratt, Pinal County, Water Intake Rate, South-of-Maricopa Farm, Slope, SCS-man Walt Parsons, Leveling, Soak, Evaporate, No Longer Run Off, Irrigating, Dead-Level Job, Pumped, Gila Loam, Clay Loam, Stanfield-Maricopa, Casa Grande, Farmers, Irrigation-Test
5	October 7, 1961	Watershed Research Reviewed - Some Advances In Brush Control, Revegetation, Increased Runoff, Capture of Desert Flood Water	X Arizona, Battle, Chaparral, Phreatophytes, Evaporation, Reduce Water Supply, Clearing, Growth Replaced, Desirable Ground Cover, Prevent Erosion, Induce Infiltration, Recharging Underground, Wells, Pits, Desert Runoff, Watershed Symposium, Arizona Water Resources Committee and Watershed Management Division of the State Land Department, Jack W. Whiteman, Empire Machinery Co., Desert Floods, Sol. D. Resnick, Absorbed, Surface Soil, Gravel Beds, Dissipated, Sun-heated Atmosphere, Arizonans, Removal, Water Wasting Vegetation, Middle Gila Clearing Project, Small Projects Act, Earth-moving Industry, Cheaper Shrub, Juniper Removal, Construction, Dams, Waterspreading Dikes, Tree Cutter, Don Lillie, Agricultural Research Service, Problem, Chaparral, Turbinella Oak, John H. Kirsh, Woody Plant Specialist, Amchem Products Inc., Chemical Lines, Results With 2,4,5-T, Low-volatility Oil Soluble Amines, Killing Turbinella Above Ground, Killing Roots, Foliage Application, Impossible, Exploring Soil, Fenuron, Get at Roots, George Glendening, Rocky Mountain Forest and Range Experiment Station, Tempe, Three-Bar Ranges, Roosevelt Lake, 1959, Fire, Erosion, Usable Runoff, Floyd Pond, Range Conservationist, Pinal Burn, Globe, Tonto Springs, Root Plow, The More Complete the Kill, the More Grass, No Grass Competes Long With Scrub Oak, Carl R. Wilder, Regional Conservation Engineer, Portland Cement Assn., Concrete In Irrigation, Nebraska, Zanjeros, Portable Irrigation Structures, Soil Cement, Douglas Lewis, U.S. Geological Survey, Cottonwood Wash, Mohave County, Big Sandy, Cottonwoods, Batamontes, Riparian Vegetation, Effects on Stream Flow, Day-night Fluctuation of Groundwater, Evaporation, Unshaded Ground, Greater, Robert V. Keppel, Hydrology of Semi-arid Ranges, Walnut Creek Watershed, Tombstone, J. Linton Gardner, Recharge, George W. Heddon, Indian Reservation Brush Control, Kel Fox, Mine Water
6	October 7, 1961	With Help From USGS - U. of A. Hydrology Dept. In Auspicious Start With Matalas, Skibitzke, Ferris on Faculty	X Worlds Best, Most Experienced, Hydrologists, Loan, U.S. Geological Survey, Instructors, Lecturers, New Hydrology Department, University of Arizona, Dr. John W. Harshbarger, Herbert Skibitzke, Analog Study, Groundwater Movement, Phoenix, Tucson, Dr. Nicholas Matalas and John G. Ferris, Washington, USGS, U. of A. Successful Start, Tom Maddock, Jr., Chief of Survey's General Hydrology Branch, Scientific Hydrology, Field Hydrology, Hydrologic Systems, Dynamics of Flow Systems in the Earth, Continental Hydrology, Analog Model Analysis of Hydrologic Systems, Mathematical Statistics in Hydrology, Tree Growth to Stream Flow, Dendrochronology Laboratory, Tree Ring Records, Dr. Andrew Douglass, Dr. Edmund Schulman

0	Year	Title of Newspaper Article	X Key Words
8	September 24, 1962	Showers Get Big Welcome in Arizona	X Rains, Tropical Storm, Lower California, Welcome Rains, Arizona, Rainfall, U.S. Weather Bureau, Phoenix, Kingman, Yuma, Show Low, Coolidge, McNary, Winslow, Payson, Colorado River
7	October 7, 1962	Water for Thirsty Cattle - Catchments Waterproofed by Lab Tester for Dime a Yard; Annual Cost of Two Cents Foreseen	X Waterproofing, Soil Catchment Structures, Stockwater Ponds, Lloyd E. Meyers, Director U.S. Water Conservation Laboratory in Salt River Valley, Journal of Soil and Water Conservation, Low-cost Precipitation Structures, Natural Surface, No Leveling, Porous Soils, Heavy Storm, Runoff, Fill Tanks, Southwest, High Costs, Hot Asphalt, Plastic Films, Metal Sheeting, Asphalt Mats, Concrete, Sprayable Materials, Rainfall, Stockwater Supplies, Rangeland, Granite Reef, Soils, Depth, Penetration, Optimum, Dosage Rates, Reactions, Salts, Chemicals, Treatment, Simulate Rain, Treated, Untreated, Burlly Rubber Sheeting, Waterproof Soil, Stabilize Against Erosion, Prevent Weed Growth, Moisture Repellant Compounds, Water-repellant Soil Particle Will Float, Sprayable Asphalt Emulsions, Soil Sterilant, Polyborchlorate
9	September 6, 1963	August Rain Near Record	X August, Wettest, Arizona, U.S. Weather Bureau, Rainfall, Five Inches, Records Started in 1895, February 1905, 5.29 Inches, November 1905, 5.49 Inches, Highest, 12.45 Inches, Natural Bridge, Near Payson, 11.29 Inches, Young, 10.49 Inches Payson, Sky Harbor Airport, Flagstaff, Williams, Globe, Miami, Paradise Valley, San Manuel, Ajo, Benson, Prescott Airport, Tucson Airport, Douglas, Yuma and Mohave Counties, Missed Heavy Rainfall, Spotty Rain
11	February 1, 1964	Flood Control District	X Citizen's Advisory Board, Flood Control District, Article, Local Flood Project or CAP?, Lacking in Research, Duplication, Central Arizona Project, Bureau of Reclamation, Flood Control Program, Maricopa County, CAP, Public Hearing, November 20, 1963, Tax Equalization Bill, State Legislature, Adoption, Comprehensive Flood Control Program Report, Board of Supervisors, Laws of Arizona, John F. Fisher, Chairman
10	March 11, 1964	City Council Will Act on Water Bids - J.H. Welsh & Son Bid for Work \$446,000; New Reservoir, Main Installations Included	X City Council, \$446,597 Water System Improvement Contract, Bond Funds, J.H. Welsh & Son, Phoenix, Water System Extensions and Improvements, Additional Water Mains, Installation of a Two-million Gallon Reservoir, Double Buttes, Southwest Section, Float Controls, One-million Gallon Northside Reservoir, Line Across Salt River, Rural-Scottsdale Road, Water Filtration Plant, Papago Park, North College Avenue, McKellips Road, Broadway, Salt River Project, John Carolla Engineer and Consultants, Zoning Appeal, Planning and Zoning, Mayor Harold Andrews, City of Phoenix, Tempe, Discuss Flood Control, Airport Plans, Freeway Routes, Public Works Director Lou Scherer, Manager Lou Cooper, C.V. Miller Co., Sewer Project, Lines North of Apache, East of McClintock
12	April 1, 1964	Flood Plan Bond Issue Year Away	X Bond Issue, Finance, Countywide Flood Control Program, County Board of Supervisors, County Manager Charles W. Miller, U.S. Army Corps of Engineers, Maricopa County Flood Control District, Federal Funds, Flood Control Advisory Board
16	July 30, 1964	Rain Runoff Floods Street (Picture)	X Rain, Runoff, Lookout Mountain Area, Seventh Street, Bell Road
17	July 31, 1964	July Wet, August to Be Wetter	X Arizona, Wettest Julys, Weather Bureau, Rainfall, Cottonwood, Verde Valley, 9.90 Inches, Ft. Huachuca, 7.94 Inches, Douglas Airport, McNary, Flagstaff Airport, Bisbee, Maverick, Tucson Airport, Horseshoe Dam, Showery Weather, Moisture Saturation, Tucson, Mogollon Rim, Runoff, Storm, Flooded Streets, Damage, Homes, Businesses, Thunderstorm, Rincon Mountains, Four-foot Wall of Water, Rushing, Pantano Wash, Stream, Diverted, Precautions, Crossing Dips, Danger of Flash Floods, Rock Slides
13	August 1, 1964	Streets Flooded From Rain Runoff - Highways Closed to Traffic	X Runoff, Valley, Showers, Streets and Highways, Blocked Traffic, Payson, Rain, Relief, Rangelands, Forests, Flash Floods, Phoenix-Payson Highway, McDowell Road, Overflow, Arizona Canal, Verde River, Bush Highway, Mesa, Saguaro Lake, North Country Club, Salt River, Granite Reef Dam, 48th Street at Salt River Crossing, Flowing, 40th Street, Williams Field Road, Lindsay Road, Flooded, Curb to Curb, McKellips Road, Indian School, Thomas and McDowell Roads, Agua Fria River, Bell Road, Cave Creek Road, Phoenix Police, 76 Accidents, Rain-slick Streets, Crossings, New River, Phoenix, Unpaved, Paradise Valley, Heavy Burst, Navajo Indian Reservation, Chinle, Six to Seven People, Deaths, Swollen Wash, Bridge, Washed Away, U.S. Weather Bureau, Kingman, Page, Rainfall, Sky Harbor Airport, Elliott Road, Highline Canal, 56th Street, 91st Avenue and Peoria, Glendale Avenue, El Mirage Road, Major Rainfall, Williams, Ajo, Ft. Huachuca, Globe, Buckeye, Carefree, Cottonwood, Flagstaff, Gila Bend, Grand Canyon, Springerville, Tucson, Winslow, Yuma
14	August 4, 1964	Better Crossing Asked	X N. Country Club Dr., Salt Riverbed, Crossing, Mesa, All-weather Crossings, City Council, Blocking, Flood Waters, Heavy, Rains, State Highway Department, Install Drain Culverts, Roadway Dry, Heavily Traveled, Scottsdale, North Phoenix

0	Year	Title of Newspaper Article	X Key Words
15	August 4, 1964	Crossing Approved	X Arizona Highway Department, All-weather Crossings, North Country Club Drive, Hayden and Scottsdale Roads, Salt River, City Council, Rain, Floods, Roads, Tempe, McDowell
18	January 29, 1965	Floods---They Can And Do Happen in Valley of Sun (& Pictures)	X Floodwaters, 1943, Seventh Avenue, Northern, 19th to 23rd Avenues, Grand Canal, Flood Scene, Flood, Phoenix, Fred Glendening, City Public Works Director, Floating on Log Rafts in Glendale in 1921, Bad Flood, Water Swept Down, Over, Cave Creek Dam, Damage, Farm Land, Extensive, Maricopa County Flood Control Project, Mayor Milton Graham, City Manager Robert Coop, Supervisors Ruth O'Neil, Barney Burns, Pat Riggs, U.S. Budget Bureau, Washington, Argue, Approval, Assurance, U.S. Army, Congressional Action, Phase B, Flood Channels and Dams, Phoenix, Cave Creek, Skunk Creek New River, Agua Fria River, Arizona Canal, Detain Water, Slowly, Channelizing Agua Fria, Flood Waters, Break, Bell Road, Moon Valley
53	February 2, 1965	Rate of Spring Snow Melt to Determine River Flow - Reservoirs Close to Capacity	X Salt River, Rampage, Valley, Runoff, Melting Snow, Richard W. Enz, U.S. Soil Conservation Service, Salt River Project Reservoirs, Salt River Watershed, Verde River Watershed, SRP Reservoirs, Releases, Spring Runoff, Runoff Peaks, White Mountains, Snow Bowl, Flagstaff, Gila River Watershed, San Carlos Reservoir, Gila River, Lake Pleasant, Lyman Reservoir
19	April 21, 1965	San Francisco Peaks (Picture)	X Heavy late Snow, San Francisco Peaks, Arizona Snow Bowl, Flagstaff, Black Bill Park, Doney Park, Dick Enz, Snow Survey, U.S. Soil Conservation Service, Runoff, Held, 32-inches Water
20	April 21, 1965	Potential Snow Avalanches San Francisco Peaks (Picture)	X Avalanches, San Francisco Peaks, Flagstaff, U.S. Forest Service, Agassiz Peak
21	April 21, 1965	Humphreys Peak (Picture)	X Ten-feet Deep Snow, Humphreys Peak, Flagstaff Water Supply, Arizona, Verde River Drainage
22	April 21, 1965	Reporters Notebook - High Waters Reveal River Facts	X Water, Salt River Channel, Scottsdale Road, Joe Kush, Myron Neuffer, Road, Closed, Old Salt River, 1941, Where, River's Channel, Below Granite Reef Dam, Provided, Sand and Gravel, Phoenix, Gravel Pits, Bed-level Highway Crossing, Old Auto Bodies, Vegetation, Other Obstructions, Central Avenue Bridge, Salt River Valley Users Association, Federal Government, Gravel Firms, Road Builders, Flooded, 1891, Phoenix, Washington Street, A Sea of Water, Tempe, Railroad Bridge Collapsed, Town, On Verge of Submerge, Other Floods, 1897, 1905 (Acer-foot Capitol Grounds), 1961, 1920, and 1941, Water Released, Canals, Filled, Heavy Rain, Small Floods, Halted Traffic, Careless Motorists, Trapped, Valley Residents
23	May 20, 1965	Runoff Report Issued by Project	X salt River Project, Evaluation, Records, Heavy Runoff, Verde River, Granite Reef Diversion Dam, Flowed, Salt River Bed, U.S. Weather Bureau, 1965 Fourth Wettest Year, Turn of Century, Exceptionally Heavy Rains, General Manager R.J. McMullin, Water Stored, Verde Reservoirs, Horseshoe and Bartlett Dams, Spring Runoff, Henry Shipley, Melting of Snow-pack, Spillway Gates, Maximum Operating Capacity, Construction Horseshoe Dam Completed 1946, Storm, SRP, Valley Government Officials, Highway Departments, Police Agencies, Granite Reef Dam, Water, Country Club Drive, Mesa, Hayden Road, Tempe, Scottsdale, Crossings, Bridges, Phoenix Area, Seventh Avenue, Salt River Bottom, Diverted, Canal System, Crop Production, City of Phoenix, Arizona Canal, Highland Canal, Deer Valley, Paradise Valley, South Mountain Area, Dependent of Pumps, Gate Water, Additional Supply, Salt River Reservoirs, 1949, Dario Travaini, Director Phoenix Water and Sewer Department
24	May 23, 1965	Computer Forecasts Future of Groundwater Resources	X Forecasts, New Electronic Computer, Future Groundwater Conditions, Central Arizona, Horace H. Babcock, U.S. Geological Survey, Arizona, USGS, Second Street and Roosevelt. Computer, First Test Run, Historical Data, Precise Water Data, Collected, Since 1939, Central Arizona Project, U.S. Bureau of Reclamation, CAP, Predict Groundwater Trends, Maricopa and Pinal County, Conceivable Change, Hydrographs, Oscilloscope, Pumping Rates, Maricopa-Stanfield Area, Depth-to-water, Intensive Pumping, Water Table, Decline

0	Yes	Title of Newspaper Article	X Key Words
25	August 1, 1965	Floods Lash Arizona Lowlands - Annual Deluge Hits in August (&Picture)	X August, Arizona, Flood Season, Damage, Rains, Angry Rapids Run, Dry Washes, Crops, Drowned, Crossings Submerged, Lives Lost, Too-full Sewer System, Miniature Lakes, Flood History, Valley Areas, Extensive Destruction, August Rains, Great Flood of 1891, Washed Out, Railroad Bridge, Salt River, Tempe, Phoenix Area, Eight Miles Wide, Verde River, Glendale Citizens, Floating of Log Rafts, 1921, 1943, Water Swept Over Cave Creek Dam, Northwest Phoenix, Desert Area, Farm Land, New Homes, Businesses, L.E. Ohsiek, Maricopa County Flood Control District, Development, Flood Plains, Washes and Rivers, Flood Hazard, Flood Insurance, Policy, Maricopa County, Planning to Build, Alerted, Tucson, Water Damages, Yuma, Flood Funds, Pima County, Farmers, Badly Hit, Tombstone, Ravaged, Flash Floods, Pinal-Santa Cruz Counties, Property Damage, Northwest Phoenix, Glendale, Projects, Flood Channels, Dams, Phoenix-Scottsdale Area, Hazardous Areas, Indian Bend Wash, Cave Creek, Skunk Creek, New River, Agua Fria River, Arizona Canal, Glendale-Maryvale Area, Comprehensive Countywide Flood Control Program, Board of Supervisors, Public Works Committee, U.S. Senate, House of Representatives, Congress, Channel Along Indian Bend Wash, Protect Scottsdale and Tempe, Rights-of-way, Relocation of Utilities, Maintenance
27	December 17, 1965	Snow Covers All Arizona Northlands	X Snow Covered, Northern Arizona, Snow, Rain, Add Thousands of Acre Feet of Water, Salt River Project Reservoirs, 34-inches Maverick, White Mountains, Jerome, Pine, Tonto Fish Hatchery, McNary, Payson, Williams, Flagstaff, Jerome, Grand Canyon, Springerville, Snowflake, St. Johns, Winslow, Painted Desert, Weather Bureau, Camp Verde, Arizona, Valley, Sky Harbor
28	December 17, 1965	New Mexico Highlands Snow-Laden	X Wintery Weather, Snow, High Country, New Mexico, Great Lakes, Duluth, Ottawa, New England, Light Rains, Southeastern Seaboard, Texas to Carolinas, Great Plains, Northern Rockies, Butte Mont., Ely, Nev., Fargo, N.D., Grants, N.M., Zuni, Arizona Boarder, Southern California, Mojave Desert, Fontana, Calif., Nevada, Eureka, Nev., U.S. 50
29	December 17, 1965	State Gets New Rain, Snow - Highway Conditions Hazardous (& Picture)	X Snow-covered Mt. Elden, Flagstaff, Heavy Snowfall, Arizona, Williams, Mogollon Rim, U.S. Weather Bureau, Sky Harbor Airport, Precipitation, Rain, Snow, Driving Conditions, Hazardous, Arizona Highway Patrol, Slick Spots, Water, Debris, Maricopa County, Phoenix, 1952 10.65 Inches Recorded, Valley's Wettest Months, Arizonans, South Mesa, Considerable Fog, Snow Flurries
30	December 18, 1965	Guess What's Due Tomorrow? R---	X Big Winter Storm, Arizona, Rain, Showers, Southeastern Arizona, Vigorous Storm System, Pacific Ocean, California Coast, Southwest, Weather Bureau, Increasing Cloudiness, Phoenix, Snowstorm, Flagstaff Area, Arizona Highway Patrol, 1905 Record 34.53 Inches Recorded, Pine, White Mountains, Payson, Show Low, Grand Canyon, Signal Peak, Pinal Mountains, Pinal County, Bisbee, Mule Mountains
31	December 22, 1965	New Storm Belts Area Wednesday - Local Measurement Totaled .69 of an Inch, Figures Varied Widely at Other Checkpoints (& Picture)	X Tempe, Hayden's Ferry, Hardy Drive and 19th Street, David Cox, Ronnie Moore, Boat Riding, Rainfall, Bad Drainage, Lake, Rain, O.L. Barnes, University of Arizona Citrus Station, UA Experimental farm, Tempe-Mesa Highway, Sky harbor Airport, U.S. Chamber of Commerce Weather Bureau, UA Farm, Storms
32	December 22, 1965	Rain, Snow Sweep State; Heavy Runoff Predicted - Reservoir Overflow Possible	X Snow Cover, Arizona, Northern and Eastern Mountains, Heavy Spring Runoff, Valley of the Sun, Reservoir's Overflowing, Mount Baldy, White Mountains, Eastern Arizona, Hannagan Meadows, Coronado Trail, Springerville, Salt and Gila River Reservoirs, U.S. Soil Conservation Service, White Mountain Apaches, Salt River Project, Heavy Rains and Snows, Dick Enz, Snow Survey Supervisor, Early Reports, Mogollon Rim, Pine, Strawberry, Becker Butte, Mount Ord, Nutrioso Area, Hawley Lake, Payson-Holbrook, White Mountain Area, White River, Big Cienega and Greens Peak Areas, East of McNary, Verde and Salt River
33	December 22, 1965	.54-Inch Moisture Falls in Phoenix	X Rain, Snow, Arizona, Flagstaff, 1905, Northern Arizona City, Rainfall, Phoenix Sky Harbor Airport, Pacific-born Storm, Yuma, Tucson, Prescott, Douglas, Grand Canyon, Record, 1914, 1923, 1926, Willard Groene, Weather Bureau Volunteer, Mummy Mountain, Paradise Valley, Rainfall, Phoenix Post Office, 13.01, 17.26 Inches in 1941, Fifth Highest Since 1896, 19.73 Inches in 1905, Heavy Rains, Flood Water, Redington, Storm, Nogales, U.S.-Mexican Boarder, Flooding, Closing, Maricopa Road Crossing, Gila River, Highway Patrol
34	December 22, 1965	Telephone Service Disrupted	X Telephone Service, Five valley Communities, Disrupted, Water-soaked Cables, Rain Flooded Manhole, Mesa, Higley, Apache Junction, Chandler, Globe, Mobil Telephones, Mesa and Tempe at McArthur and Apache Trail

0	Year	Title of Newspaper Article	Key Words
35	December 23, 1965	Flood Threat Along Gila - Graham, Greenlee Warned	X Flood Warnings, Gila Valley, Southeastern Arizona, Heavy Rains, Melting Snow, Mountains, Arizona-New Mexico Border, Agua Fria River, Van Buren Crossing, Avondale Police, River, 200 Yards Wide, U.S. Weather Bureau, Phoenix, Graham and Greenlee Counties, Danger, Flooding, Gila River, Cliff, N.M., Over Flood Stage, San Francisco River, Running, Clifton, Flood Stage, Crest, High Water, Safford, Graham County, Arizona Highway Patrol, Sandbagging, Telephone Circuit Out, Gila and San Francisco Rivers, Gila Empties, San Carlos Lake, Coolidge Dam, San Carlos River, Overflowed, Banks, Peridot, U.S. 60-70, 7-Mile Wash, Evacuated, Mile Windham, Bureau of Indian Affairs, San Carlos Indian Agency, Homes, Water 3 to 4 Feet Deep, Floodwaters, 47th Avenue and Crittendon Lane, Phoenix, Storm Drains Overflowed, Central at Arizona Canal, Closed
36	December 23, 1965	Reservoirs Brimming Over - Too Much Water Below Roosevelt Dam Creates Flood Problem for Valley Lower Lakes	X Reservoir Storage Problem, Salt River Valley, Salt River Project, Salt River System, Stewart Mountain Dam, Saguaro Lake, Spillage, 48th Street, Swelled, Runoff, Reservoirs, granite Reef Diversion Dam, Regulates Water, Canal System, U.S. Soil Conservation Service, Watershed Storage, Spring Runoff, Richard L. Enz, Snow Survey Supervisor, Snow Cover, Mountains, Water Storage, 1941, Salt River Reservoirs, Overflowed, Safety Vale, Dumped, Valley's Canal System Fill, Divert Water
37	December 23, 1965	Reservoir Overflow Possible	X Runoff, Roosevelt Lake, Salt River, Highest Peak, Records Started 1913, U.S. Geological Survey, Salt and Verde Watersheds, Salt River Project, Overflowing, Additional Showers, Valley, Weather Bureau, Rod J. McMullen, Salt River Project General Manager, Roosevelt Dam Spillway, Spillway Gates, Four-dam Salt River System, Flooding, Gila River at Safford, Sacaton, Chandler, Washes, Low-lying Areas, Tucson, Phoenix, Agua Fria, New River, Swirling Water, Broke Dike, Overflowed, Estrella Mountain Park, U.S. 80, Goodyear, Flood Path, 15 Feet Deep, Closed Roads, County Highway Department, Runoff Peak, 1941, Dike, Santa Cruz Rim, Threatening, Farm Homes, Stanfield, Verde River, March 1938, Sahuaro Lake, Mormon Flat Dam, Rains, Salt River's Storage Chain, Peak Operating Capacity, Granite Reef Diversion Dam, Salt River Bed, Bartlett, Canyon Lake, Heavy Runoff, Control of Storage Water, Roosevelt Dam, Apache Lake, Horse Mesa Dam, Valley Traffic, Tempe Bridge, Country Club Drive, Mesa, Giant Culverts, Pavement Was Awash, Northern Arizona, Eight Inches Snow, Flagstaff, Tempe Crossing, Riverbed Traffic, 40th and 48th Streets, Scottsdale and Hayden Roads, Thomas and Indian School Roads, Glendale and Northern Avenues, Luke Air Force Base, Litchfield Road, Slick Streets
40	December 23, 1965	Get Out the Swim Fins, Men, The Chuckholes are Filling	X Chuckholes, Uncollected Trash, Phoenix, Rains, Worst Level, December 1959, James A. Stokely, Superintendent of Street Maintenance, Poor Street Construction, Heavy Traffic, Poor Drainage, Lack of Paving, Curbs, Gutters, Proper Rain Runoff, Rainstorm
41	December 23, 1965	Heavy Snowfall In North	X Snow, Rain, Arizona, Flagstaff, Grand Canyon, Kingman, Williams, Weather Bureau Warnings, Water, Run High, Desert Washes, Riverbeds, Phoenix, Roads, Closed, Maricopa Road, 56th Street Near Guadalupe, Mogollon Rim, White Mountains Area, Tucson, Mesa Experimental Farm, Douglas, Yuma, Gila Bend, Nogales, McNary
38	December 25, 1965	State Reservoirs Continue to Fill	X December Storms, Tripled Stored Water, Salt River Project's Lake System, Fill Six Major Lakes, Runoff, Central Arizona Watersheds, Horseshoe Dam, Vigorous Verde Flow, Release Water, Spillway Gates, Stewart Mountain Dam, Saguaro Lake, Roosevelt Lake, Bartlett Lake, Melting, Snow, Rainstorm, Apache, Canyon, Horseshoe Dam Maximum Level, Dump, Water, Match Input, Granite Reef Diversion Dam, Salt River, Phoenix
39	December 25, 1965	Flood Areas Welcome Sun	X Flooded, Rain Drenched, Arizona, Muddy, Snow, Northern Mountains, Weather Bureau, Gov. Goddard, Flew Over, Flooded Sections, State of Emergency, Special Funds, Arizona Legislature, Civil Defense Department, Repairing Damages, Public Facilities, Sewer and Water Systems, Public School Buildings, Bridges, Roads, Pima County, Pinal and Graham Counties, Casa Grande, Safford, Floodwaters, Receding, State Civil Defense, 82 Families, Homeless, Overflowing Gila River, Damage, CD Director Carl N. Smith, Runaway Water, Salt River, valley, In Half, Bridge at Tempe, Central Bridge, Seventh and 16th Streets, Maricopa Freeway, Closed, Washed Out Roads
42	December 27, 1965	Water Runoff for December Tops All Previous Records (& Picture)	X Water Runoff, Verde-Salt River Water Conservation System, Greatest, December, Recorded History, Salt River Project, Flooding, Lower Salt River Channel, Rains, Upriver Watershed, Nearly Full, Reservoirs, Salt and Verde Rivers, Melting Snow, Roosevelt Lake, Roosevelt Watershed, Apache Lake, Horse Mesa Dam, Canyon Lake, Saguaro Lake, Stewart Mountain Dam, Granite Reef Dam, SRP, Hayden and Scottsdale Road Crossings, Mill Avenue, Tempe, Verde System, Horseshoe Dam, Horseshoe Lake, Bartlett Lake, Two-river Storage System, Salt River, Tempe Butte, Serpentine Course, Valley, Foothills, Superstition and Mazatzal Mountains, Apache Gap

0	Year	Title of Newspaper Article	X Key Words
43	January 8, 1966	Tree Rings, Rain and Flow Records Show - Long Arizona Drought May be Over	X Wet Spell, Arizona, Tree Rings, Sam Turner, Wet Cycle, Colorado River Runoff, Dry Cycles, San Carlos Reservoir, Rain, Southwest, Storms, Graphs, Tables, Dendrochronology Reports, Rainfall Records, Climatological History, Calculations, Samuel F. Turner, Former Chief of U.S. Geological Survey Groundwater Investigations, Senate Subcommittee, Central Arizona Project, Arizona-Farmer Ranchman, Consulting Hydrologist, Dr. A.E. Douglass, University of Arizona, Annual Growth Rings, Tree Ring Records to 1600, Colorado Basins Above Lees Ferry Back to 1250, Weather Bureau Records Back to 1855, Stream Flow Measurement to 1900, Years from Wet Cycle to Beginning 57, Shortest 41 Years, Longest 77 Years, Ho-Ho-Kam from Central Arizona, Wet Cycles, Starting 1365, 1490, 1548, 1603, 1824, 1904, Wet Cycle Precipitation State Average 13.41 or More, Dry Cycle Precipitation Average or Below, Flagstaff, Tucson, Salt River Project Reservoirs, 1941, San Carlos Project, Big Dam, Gila, Melting, Snowbanks, Runoff, Warm Rain, Torrent, Flood Damage, Marana, Picacho, Upper Gila
44	January 11, 1966	SRP Closes Spillways; Eyes Upland Weather	X Release, Water, Salt River Project Dams, Emergency Repairs, Roads, Public Facilities, Salt River Channel, SRP General Manager Rod J. McMullin, Channel Dry-up, Unanticipated Rainfall, Melting Snow, Increased Runoff, Reopening, Spillgates, Salt River Valley Area, Salt and Verde River Systems, Granite Reef Diversion Dam, Salt River Crossings, Maricopa County Highway Department, Sam Lanford, Scottsdale and Hayden Roads, Rivers Flow
45	January 11, 1966	From Floods - New Perils: Drownings, Mosquitos	X Stagnant Waters, Arizona's, Heavy Rains, Floods, Prospects of Drownings, Disease, Mosquito Infestation, State Health Commissioner William J. Moore, Dangers, Dr. Frederic Baum, Canal Systems, Left-over Pools, Hazards, Youngsters, Dangerous Dropoffs, Dangerous Currents, Dr. P.M. Hotchkiss, Acute Communicable Diseases, Animals, Drink Wallow, Infected Animals, Pollute, Pools of Water, Germs, Leptospirosis, Swimming Pools, Mosquito Population, Encephalitis
46	January 13, 1966	Snow Deep on Watershed, SRP Chief Tells Rotarians	X Salt River Project Watershed, Verde and Salt River Dams, Mesa Rotary Club, Rod J. McMullen, SRP General Manager, Watersheds, Saturated, Mesa Country Club, Storming Water, Criticism, Flood-control Agency, Facts, Water-storage Agency, Water Release, River Bed, County Flood Control Program, Big Flow Down Salt River, Dam Releases, Valley, Heavy Rains, Prescott, Verde Watershed, Tributary Flows, Sycamore Creek, Tributary Runoff, Country Club Drive, Swept Out Highway
26	January 16, 1966	Guy Stillman Heads Flood Committee	X Guy Stillman, Maricopa Citizens Flood Protection Committee, Scottsdale, Valley, World War II, \$115 Million Flood Control Program, Special County Election, W.B. Barkley, Bonds, Federal Construction Funds, County Funds, Modify, Roads, Bridges, Flood Control Structures, U.S. Army Corps of Engineers, Soil Conservation Service
47	January 18, 1966	Cold Spell Holds Back Runoff - Storm Hits State	X Storm, Arizona, Rain, Snow, Major Runoff, Salt and Verde Rivers, Phoenix, Valley, Damages, Floodwaters, Inundated, Salt River, Salt River Project Officials, Watershed, Precipitation, Rainfall, Storage Reservoirs, Heavy Moisture, Gila River Watershed, Show Low Airport, Superior, Highway, Safford, Clifton, Closed, St. Johns, Flagstaff, Winslow, Douglas, Ft. Huachuca, Nogales, Gila Bend, Payson, Prescott, Tucson, Winslow, Yuma, Maverick, White Mountains, Grand Canyon Village, Four Peaks, Roosevelt Dam, Henry Shipley, SRP, Granite Reef Diversion Dam, Salt River Bed, Richard Enz, Survey Chief of U.S. Soil Conservation Service, Mogollon Rim, Salt River Drainage, Workman Creek, Heber's Precipitation, Hannagan Meadows, Sheep Crossing, Little Colorado, Baldy Course, Verde River, Happy Jack, Mingus Mountain, Runoff, Weather Bureau, Sky Harbor, Downtown Phoenix, Rainfall, Storm Cold Low, Cold Upper Level Low Pressure, Valley of the Sun, Globe-Miami, Show Low-McNary, Cottonwood and Verde Valley, Prescott
48	January 18, 1966	Gila Bend Rainfall Exceeds Average	X Gila Bend, Rainfall, Maricopa County
49	January 18, 1966	New Watch Set at Lakes	X Winter Storm, Snow, Rain, Arizona, Salt River Reservoirs, Superior, Nogales, Phoenix, Salt River Project, Salt and Verde River Reservoirs, Repair, Damage, Crossings, Arizona Highway Patrol, Show Low, Pinetop, Globe-Miami, Flagstaff, Williams, Heavy Showers
50	January 18, 1966	\$16 Million in City Projects Approved	X Phoenix City Council, Approved, \$16 Million, Improvement Program, Gasoline Tax, Citizen's Board Advisory Committee, Construction, 20-Million-gallon Water Reservoir, South Mountain, Major Water Lines, South Phoenix, Storm Sewers, Tennis Center, Park Sites
51	January 18, 1966	Flood Claims Examined	X Tempe, Acting City Manager Gale Christy, Dismiss Flood Claims Against City, Municipal Officials, Insurance Adjuster, Damage, Salt River Flood
52	January 18, 1966	Flood Relief Workers Deserving Applause	X Flood Relief Crisis, Arizona Red Cross, Phoenix High School Employees

0	Year	Title of Newspaper Article	X Key Words
56	January 20, 1966	More Wet Weather Due, but No Flooding - More About Wet Weather on Way	X Wet Weather, Arizona, Rain, Snow, Scattered Showers, Valley, Weather Bureau, Storms, Salt River Project, Project's Six Lakes, SRP Watershed, Halt Flow of Reservoir, Precipitation, Maverick, Carefree, Ft. Huachuca, McNary, Nogales, Payson, Williams, Ballejos Family, Winslow
57	January 22, 1966	Thanks to December Storms - Most Water, Best Feed Since 1941 - Rosy Outlook to Every Irrigation District with Storage - But Floods Have Done Much Damage and Spring Runoff May Bring Other Deluges	X Arizona, Series of Storms, Thanksgiving Day 1965 to New Year's Day 1966, Flood Damage, Farms, Pima, Pinal, Graham, Greenlee Counties, Ranges Soaked, 1941, Runoff, Reservoirs, Moisture Seeping into Range Soil, Salt River Project, Danger of Flood, Phoenix, Stream Flowing Down Salt River, Repairs to Road Crossings, Gas Lines, Domestic Water Mains, Salt River Valley, Gila, San Carlos Reservoir, Spring Thaw, First Time, History Goes Back to 1929, First Time, Water Flowed Down Salt and Gila, Detention, Painted Rock Dam, Gila Bend, Yuma County, Dam, Check the Flow, Lake Pleasant, Agua Fria, Maricopa Municipal Water Conservation District, Commonly Known as Beardsley Project, Waddell Dam, Impound, Irrigation Reservoirs, Spilling Over, Lyman Dam, St. Johns, Lake Watson, Prescott, Chino Valley's Water, Colorado, Lake Powell, Lakes Mead and Mohave, U.S. Geological Survey, USGS Water Resources Division, Tucson, Flood Damages, Peaks, Stream Flow, Highest Since 1916Roosevelt, Verde Flow, Santa Cruz, Water-level Rises, Water-level Declined, Wells
58	January 22, 1966	Flood Bond Proposal to Voters in March	X March 8, Maricopa County's Flood Bond Election, \$22.7 Million, Flood Control Proposal, Dams, Dikes Channels, Levees, Army Corps of Engineers, Soil Conservation Service, Right-of-way, Modify, Roads, Bridges, Maintain Control Works
59	January 26, 1966	Dry-up Time is Extended by Project	X State Highway Department, Deepening, Salt River Channel, Country Club Drive, Water, Released, Salt River Project, Dry-up, Emergency Repairs, SRP, Stop Releases, Run-off, Storage "Hole", Warm Rainfall, Melt Snowcap, Henry Shipley, River Channel, Unfilled Capacity, Cliff Potts, Repair Work, Bee Line Highway Crossing, Black-topping, Roadway
60	January 26, 1966	Dry-up in Salt River Bed is Extended for One Week	X Dry-up, Salt River, Continuation of Repair, Roads, Utility Lines, River Bottom, Salt River Project, Excess Watershed Runoff, Historic Channel, Reservoir Dam Spillway, Closed, Henry Shipley, Assistant General Manager of SRP, Water and Irrigation Facilities, Cutoff, Warm Rainfall, Melt, Watershed's Snowcap, Force Reopening of Spillway, Emergency Repairs, Workmen, County Highway Department, New Detour, Scottsdale Road Crossing, Flow, Confined, Existing Low-flow Channel, Steel Culvert, Built, Utility Company Crews, Electrical and Gas Lines, Phoenix, Spring Rains, Lakes Levels, Reserve Capacity, U.S. Soil Conservation Service, Comprehensive Snow Survey, Inflow, Project Lakes, Salt, Tonto, Verde Rivers, Canals, Fill Water Orders
62	February 2, 1966	SRP Dry-up is Extended Second Time	X Dry-up, Salt River, Granite Reef Diversion Dam, Henry Shipley, Assistant General Manager of Salt River Project, Snow-cap
61	February 3, 1966	State Water Storage Highest in 25 Years - Big Runoff Also Seen for Spring	X Water Storage, Arizona, Highest Level, Spring Runoff, Snow Cover, Arizona Watersheds, Moisture Content, High, Runoff, Wasted Down Rivers, Reservoirs, Salt and Verde Rivers, Tonto Creek, U.S. Soil Conservation Service, Lake San Carlos, Gila River, Coolidge Dam, Phoenix, Salt River Project, SRP, Major Additional Releases, Irrigation, Valley of the Sun, Storage for Irrigation, Electric Power Generation, Crop-watering Months, Leveling Off Flood Waters, Richard Enz, Snow Supervisor for Soil Conservation Service, Heaviest Snowpack, Gila River Watershed, Salt River Drainage, 1952, 1960, 1962, Lake Pleasant, Beardsley Project, Agua Fria River, Lyman Lake, Little Colorado River, Show Low
54	February 16, 1966	Watershed Snow Pack Heavy But Still in Deep Freeze	X Salt and Verde Watershed, Snowpacks, Heaviest, Frigid, Potential Rivers Locked, Richard Enz, U.S. Soil Conservation Service, Mt. Orr, Salt Watershed, Verde Watershed, Gila Watershed, Mt. Lemmon, Tucson, Salt River Project
55	February 17, 1966	Help Pass Bond Issue	X Bridge, Salt River, Flood, March 8, Countywide Bond Election, Army Corps of Engineers, Rebuilding Bridges and Roads, Costly, Damaged, Physical Injuries, Time Lost, Flood Protection, Taxes, Flood Control
64	December 4, 1967	Flood Aids Ground-Water Supply, Engineer Reveals	X Ground Water Supply, Water, Dry River Beds, R.A. Rukkila, Water Engineer, U.S. Geological Survey, Phoenix, Salt River Valley, Flood, Water Running, Bank to Bank, Salt River, Crossings, Washed Out, Tempe Bridge, "Ground Water in Arizona", Valley, Water Levels, Wells, Increased, Spring 1965, Phoenix - Glendale - Tolleson - Deer Valley, New River - Skunk Creek Basins, Recharge, Clay, Silt, Sand, Water Level Declined, Centennial Area, Litchfield - Buckeye - Beardsley - Marinett Area, Liberty - Hassayampa Area, Santan Mountain Area, Magma, Depths of Water, 1966, Queen Creek, Florence Junction, Cave Creek, E.B. Hodges, Mining, Controlled, Proper Management

0	Year	Title of Newspaper Article	X Key Words
65	December 19, 1967	Flooding, More Snow Possible	X Forecast, Winds, Gusts, 50 Miles Per Hour, Phoenix Metropolitan Area, U.S. Weather Bureau, Thunderstorms, Heavy Showers, Warnings, Wintry Storm, Arizona, Danger, Flooding, Storm, Death, Clarence R. Bickford, Flagstaff, Mrs. Lennea Tobin, Buckeye, Kenneth E. Prince, Arizona Highway Department, Flying V Maintenance Camp, Globe, Sen. Boyd Tenney, Yavapai, Sen. E.H. Thode, Pinal, Apache County, Governor Williams, Utah, Colorado, New Mexico, Federal Government, Four States Badly Stricken by Storm, Yavapai County Board of Supervisors, Emergency Situation, Bill Beers, County's Civil Defense Director, Snow, Over 2 Feet Deep, Prescott, Rain, Big Runoff, Constellation Area, Wickenburg, Record Depth Recorded 1949, Hawley Lake, Maverick, White Mountains, Arizona Weather History, Payson, Alpine, Show Low, Grand Canyon, Phoenix Sky Harbor, Federal Aviation Administration, Gusting Winds, 68 Miles Per Hour, Phoenix, Cold, Melting Snow, Change in
63	December 21, 1967	Reservoirs Easily Able to handle Runoff Waters	X Runoff Water, Arizona Reservoirs, Streams Feeding Reservoirs, Salt River Project, Six Lakes, Storage Capacity, Heaviest Flow, Verde River, Peak, Flow Declined, Salt River, Tonto Creek, Horseshoe, Bartlett, Roosevelt, Apache, Canyon, Saguaro, Storm Runoff, Salt River Channel, Granite Reef Dam, New River, Skunk Creek, Local Rainfall, Coolidge Dam, San Carlos Reservoir
66	January 6, 1968	Free Water and Spring Runoff Outlook Hearten Farmers of Salt River Valley	X Free Water, Salt River Project, Farmer, Eight-day Storm, Extraordinary, Disastrous, Arizona's History, Canals, Dry, Warm Rain, Cave Creek, Arizona Canal, Salt River, Danger Points, Henry Shipley, Assistant General Manager for Operations and Maintenance, Bob Moore, Irrigation Superintendent, Turnout Structure, Wash, Flooded Road, Control Center, Tempe, Telephone Headsets, Data Into Computers, Stream Gages, Radio Connections, Salt River Canyon, Globe, Granite Reef, Phoenix, damage, Verde, Bartlett and Horseshoe Reservoirs, Rain-melted Snow, Verde Lakes, Salt, Saguaro, Arizona Canal, Sycamore Creek, Fort McDowell, Drowning the Bollworms, Cotton Growers, Pink Bollworms, Mazatzals, Four Peaks, Flagstaff, Trouble, Moss, Algae, Piled Up, Every Structure, Impeded Flow, Canal Breaks, Spill Over, Empty Storage Capacity Behind Dams, Flood Hazards Downstream
67	February 1, 1968	Snow Deep - Runoff Assures Full Reservoirs	X Snow, Water, Surveys, Verde and Salt River Watersheds, Full Reservoirs, Salt River Project, Spring Runoff, Mogollon Rim, Verde Drainage, Baker Butte, Pine, Richard Enz, Snow Survey Chief, U.S. Soil and Water Conservation Service, Deep Snow, Heber Sector, White Mountain Area, Salt River Drainage, Mount Baldy, Maverick Fork, Storm, San Francisco Peaks Inner Basin, Flagstaff, Runoff, Beaver Head, Nutrioso, Hannagan Meadows, Coronado Trail, Mormon Lake, Newman Park, Munds Park
68	February 19, 1968	Water Release Possible	X Release, Water, Salt River Channel, Granite Reef Dam, Spring Runoff, Salt River Project, Temporary Dryup, Snow, Watersheds, Reservoirs
69	March 2, 1968	Nary a Saltcedar Back on Coolidge Dam After Mid-'69	X Reservoir Basin, Coolidge Dam, Clear of Phreatophytes, Target Date, July 1, 1969, Richard C. Culler, U.S. Geological Survey, Bureau of Indian Affairs, Saltcedars, Water-wasting Plants, Gila, Under Water, Reservoir Filled, Capacity, Coolidge Lake, Drowned Out, Acres of Saltcedars, December Storm, Spring Runoff, San Carlos Irrigation District, Pinal County, Saltcedars can Use Seven Acre-feet a Year
70	March 1, 1969	Phreatophyte Friend or Foe	X Water, Scarce, American Southwest, U.S. Supreme Court, Colorado River, Wasted by Phreatophytes, Phreatophytes, Depend on Ground Water, Roots, Characteristic, Drawing on Ground-water Reservoirs, Like Pump, Well Plant, Grasses, Large Trees, Alfalfa, Low Economic Value, Consumptive Waste, Replacing, Beneficial Vegetation, Sycamores, Sycamore Creek, Sunflower, Arizona, Essential Shade, Large Valleys, Sediment, Storage Reserves, Protection, Erosion, 8 or 10 Real or Potential Problem, Salinity, Climate, Saltcedars, River Valleys, Removal, Temporary, Permanent, Removed, Proposed Channelization, Gila River, Phoenix, Corps of Engineers, Geological Survey, Floodway, Reduce Flood Hazards, Aerial Photograph, Granite Reef Experimental Area, Tamarisk, Seepwillow
71	January 3, 1973	State Water Supply Outlook Good, Snow Samples Show	X 1973, Water Supply, Outlook, Arizona, U.S. Soil Conservation Service, SCS, Snow Samples, Average Snowfall, Streams, Larger Reservoirs, Gila, Verde, Salt Watershed, Little Colorado Watershed, Rim, Williams, Heber, San Francisco Peaks, Precipitation, Heavy Rains, Runoff, Reservoir Storage, Soil Profiles, Heavy Snow Cover, Light Storms, Soil Moisture, Field Capacity, Saturation, Heavy Runoff, Melting Snows, Salt River Project, San Carlos Reservoir, Streamflow, Water Supply, Salt and Verde System, San Carlos Project
72	January 3, 1973	Greater County Funding Needed for Flood Control	X Maricopa County, Flood Control Funds, Flood Control Protection, Scottsdale, Valley, Maj. William Worthington, U.S. Corps of Engineers, Special Task Force, Phoenix Metropolitan Chamber of Commerce, Maricopa County Flood Control District, Public Works Director Marc Stragier, J. Stephen Simon, Federal Government, Project Funding, Right-of-way, Maricopa Association of Governments, Scottsdale Chamber of Commerce, Garth Fuquay, Corps of Engineers, Randy Scoville, MAG, County-wide Bond Issue

0	Year	Title of Newspaper Article	X Key Words
73	January 3, 1973	Snowpack Heavy, Salt Could Flood	X Flood Control Experts, Warm Rain, Flooding, Salt River, Valley, Winter 1965-66, Snow, Packed, Water Sheds, Verde and Salt Rivers, Two Lakes, Near Capacity, Dick Enz, U.S. Soil Conservation Service, Snow Cover, Flagstaff, Verde River, Substantial Run-off, Salt River Project, Dry-up, Arizona Canal, Six Lakes, Roosevelt, Metropolitan Chamber of Commerce, Flood Control Measures, Flood of 1965, Ted Wilson, SRP
74	February 20, 1973	Water Could Flow in Salt River - Then, Again...	X Water, Flow, Normally Dry, Salt River, Scottsdale, Salt River Project, U.S. Soil Conservation Survey, Watershed Areas, Salt and Verde Rivers, Valley, Heavy Snowfall, Overflowing, Horseshoe and Bartlett Lakes, Release of Water, Reservoirs, Tempe, Tempe Bridge Crossing, Country Club Drive, Thawing, Snow Pack, Saguaro, Canyon, Apache, Roosevelt, Snow Survey, Runoff, Unexpected Warming, Rain, Fill, Verde Reservoir, Verde System, Salt System, Projected Storage, Verde River, SRP
75	March 19, 1973	Salt River to Flow at Least a Month	X Salt River Valley Residents, Water, Flow Down Riverbed, Salt River Project, Melting Snow, Hit With Heavy Rainstorm, No Major Flooding, Richard Enz, U.S. Soil Conservation Service, Verde River Watershed, Salt River Watershed, Verde System, Flooding, Storm, Dumps, Runoff, Water Flows, Salt River Reservoir, Verde Reservoir, Reid Teeple, SRP, Verde River Lakes, Salt River Bed, Salt River Crossings, Reopened, Scottsdale and Hayden Roads, Country Club Drive, Mill Avenue Bridge, Tempe, Robert Ingram, Chief Meteorologist, Phoenix Office, National Weather Service, Gulf of Alaska, California
76	March 19, 1973	No Large Releases Expected - Flooding Seen Through May	X Salt River Project Officials, Phoenix, Water Released, River Bottom, Unbridged River Crossings, Closed, SRP, Lakes, Water Shed, Snow Melt, Bob Ingram, National Weather Service, Normal Precipitation, Safe Runoff, Warm Rains, Problems, Dick Enz, U.S. Soil Conservation Service, Snow Pack, Verde and Salt Systems, Peak Flows, Tempe Bridge, Freeway, Central Avenue Bridge, Open, River Crossing
77	March 23, 1973	Flagstaff Snow Hits 174 Inches, Tops '49 Mark	X Storm, Arizona, Record, Winter Snowfall, 174 Inches, 167 Recorded 1949, Flagstaff, Paul Sorenson, National Weather Service, Flagstaff Airport, Mogollon Rim, White Mountains, Southeastern Arizona, Extensive Water, Snow Damage to Roads, Dick Williams, Assistant City Manager, Repair Work, Heavy Precipitation, Salt River Project Watershed, SRP, Phoenix Police Department, Roads, Open Salt River, Interstate 10, 40th, 24th, 16th and Seventh Streets, Central and 19th Avenues, Maricopa County Sheriff's Office, Tempe Bridge, Country Club Drive, Camelback, Closed, Agua Fria River, Maricopa County Board of Supervisors, Pontoon Bridges, Not Hold Up, Water Flow, Bailey Bridges, Preconstructed, Suspension-type Bridges, Span Waterways, Prohibitive, Francis Lathrop, Assistant County Engineer, Capt. John Katin, U.S. Army Corps of Engineers, County River Crossings, Col. John C. Lowry, Chief Engineer and General Manager, County Flood Control District, Unlined Pilot Channel, Tempe, River Bed, Scottsdale Road, Temporary Access Bridge
78	March 24, 1973	Valley Has Sun Again But River Cuts Road	X Valley Residents, Winter Storms, Salt River, River Crossing, Mill Avenue Bridge, Tempe, Country Club Drive, Scottsdale Road, Open, Salt River Project, Release Water, River Bed, Snow High Country, Four Salt River Lakes, Storm System, Arizona, Texas, Oklahoma, Moist Air, Snow Flurries, Flagstaff, Grand Canyon, Yuma
79	April 2, 1973	Heavy River Flow to Continue Week	X Water, Flowing, Salt River Bed, Valley, Reid Teeple, Salt River Project Assistant Manager for Water, Flow, Heavy, Close Major Crossings, Tempe Interstate Bridges, SRP Board of Governors, Verde Reservoir, Salt Reservoir, Granite Reef Diversion Dam, Exceed Reservoir Capacity, Storage Capacity, Verde Watershed, No Snow
80	April 6, 1973	Worst Flooding Ended	X Flood Waters, Mississippi, St. Louis, Flooding, National Weather Service, Rain, 1844, U.S. Corps of Engineers, Hannibal Mo., Cairo, Ill., Illinois, Missouri, Coast Guard, President Nixon
81	May 9, 1973	Watershed Runoff Peak Said Reached	X U.S. Soil Conservation Service, Spring Runoff, Water Flows, Salt River Watershed, Recede, Mogollon Rim, White Mountains, 1941, Salt River Project, 1968, San Carlos Reservoir, Gila River, Coolidge, Record Levels, Snowpack, San Francisco Peaks, Mt. Ord
82	December 27, 1985	Tighter Limits on Water Usage Planned	X Phoenix, Water-Conservation Goal, Water and Waste Department Director Bill Korbitz, City Council, Water Cops, Water Rate Increases, Lawn Watering Restrictions, Salt River Project's Water Supply, Central Arizona Project, CAP, Arizona Groundwater Management Act, 1980, Phoenix Active Management Area's First Management Plan, Frank Barrios, Annual Enforcement Program, Water-control Agents, Bill Mee, City Hall, Sky Harbor International Airport, Prescott, Hell's Canyon Rest Area, U.S. 89, Landfill, George Christiansen, Israelis, Sol Resnick, University of Arizona, Mediterranean Sea, Lined Tanks, Canals, Drip-irrigation Systems, European Market, Jordan River, Ground Water, Pumping Recharge

0	Yes	Title of Newspaper Article	X Key Words
83	December 27, 1985	Conservation Efforts Won't Wash	X City Officials, Dam Up Water Waste, Phoenix, Arizona Groundwater Management Act of 1980, Water and Waste Department Director Bill Korbitz, Ground water, Slowed, Broken Sprinklers, Black Canyon Freeway, City Parks, Watered, Raining, City Councilman Duane Pell, Complaints, Water Waste, Valley Residents
84	February 21, 1986	Supervisors Asked to Foot Water-Recharge Bill	X George Campbell, Chairman, Maricopa County Board of Supervisors, Valley Water Leaders, \$5 Million, Taxpayers, Recharge Colorado River Water, Ground, Save Arizona's Future Economy Committee, California, Mexico, Central Arizona Project, Bill Chase, Water Advisor, Phoenix, Maricopa County Flood Control District, Phoenix Active Management Area, Salt River Project, Agri-business Council of Arizona, Legislation, Pending, House, Recharge Surplus Water, Flood Control Project, Karl Kohloff, Mesa Water Advisor, Central Arizona Water Conservation District, Maricopa, Pinal, Pima Counties, Jim McIntyre, CAP, SAFE
85	March 19, 1986	Editorials - Some Lakes Actually Conserve Water	X Arizona, Population, Central Arizona Project, Senate Bill 1377, Restrict Ornamental Lakes, Treated Effluent, Lakes, Ponds, Lagoons, Swimming Pools, Fountain, Fountain Hills, Scottsdale, Intolerable Waste, Uses High Quality Effluent, Potable Water, Western Savings Leisure World, East Mesa, Own Sewage Treatment Plant, Living Lake, Aquatic Life, Fish, Algae, Catches Storm Runoff, Prevent Flooding, Water Conservation Lake
86	May 23, 1986	Valley Could Sustain Growth if Conservation Practiced	X Central Arizona Project, Wastewater, Valley, Colorado River, Arizona Project Canals, CAP, Phoenix, Groundwater Levels, Charles B. Hincley, Water Resources Consultant, Farm, Drip Irrigation, Desert Plants, Swimming Pools Covered, Gold Courses, Native Grasses, Desert Landscaping
88	Undated 01, 19??	Indian Bend Wash - TCE 'No Major Problem	X High Levels, Carcinogen, Indian Bend Wash, Scottsdale's Water, Trichloroethylene, TCE, Charge, Underground Water Tables, Leonard Dueker, Executive Assistant City Manager, Recharging, Recovering Water, Phoenix, Salt River Project, McKellips and Indian School Roads, Miller and Granite Reef Roads, Legislation, Gov. Bruce Babbitt, Underground Aquifers, Pumping, Percolate Down, Contaminated Water, 82nd Street and Osborn Road, Water from Well, U.S. Environmental Protection Agency, Clean-up Efforts
87	Undated 01, 196?	County to Study Need of Water Supply Zone	X Water Replenishment Zone, County's West Basin, M.E. Salsbury, County Flood Control District Chief Engineer, Zone Established 1954, July 1, 1964, Re-established, West Basin Water Association, Board of Supervisors, Burton W. Chace, Kenneth Hahn, Los Angeles, Segundo, Manhattan Beach, Inglewood, Hermosa Beach, Redondo Beach, Hawthorn, Lawndale, Torrance, Gardena, Rolling Hills, Rolling Hills Estates, Palos Verdes Estates, Underground Supplies, Buy Imported Water, West Coast Basin Barrier Project, Fresh Water Supplies, Waste Water, Hyperion Outfall Plant

Flood

The Arizona Republic, Phoenix, Arizona

Storm Supplies Additional Data For Flood

By BEN AVERY

While homeowners at critical points were fighting to keep mud, water, and debris out of their homes Wednesday afternoon, engineers for the county, city, and Salt River Project were trying to handle the floods, learn where they were coming from, and how best to control them in the future.

The Wednesday storm was just a summer thunderstorm as storms go, but they come so infrequently in Arizona that everyone but the officials responsible for controlling floods seem to forget them.

GREATEST weather bureau precipitation measurements in the heart of the storm area were 1.43 inches at Sunnyslope; 1.48 at Cave Creek Dam, and 1.30 at 37th Street and Osborn.

The water fell rapidly, ranging from a 30-minute downpour at 37th and Osborn to about an hour at the other two locations.

"But it cannot be considered a serious storm," said Paul F. Glendenning, county engineer.

The heaviest single storm recorded at the Phoenix Weather Bureau dropped 4.98 inches during the July 1-2 period in 1911.

This time, however, the engineers took more than usual interest because they now are in a position to plan some flood control work, with the creation Monday of the Maricopa County Board of Supervisors of a county flood control district.

Throughout the storm, Glendenning was on the ground observing floodwaters from 35th Avenue east to the vicinity of 16th Street. Yesterday he flew the area to the north to determine where the floodwater came from.

"MOST OF THE water fell this side of Cave Creek Dam," he said. "One wash south and west of the dam, which drains about

Control District of Maricopa Co.

Friday, August 7, 1959

The Phoenix Gazette Flood Control Plans

Established in 1880
ARIZONA'S PROGRESSIVE NEWSPAPER
"Where The Spirit Of The Lord Is, There Is Ser
II Corinthians 3:17
Published Weekday Evenings in Arizona's Capital by
PHOENIX NEWSPAPERS, INC.
at 120 East Van Buren, Phoenix, Arizona
Eugene C. Pulliam, Publisher

PAGE 6

MONDAY, AUG

a 7-square-mile area, filled the bridge that carries it under the Black Canyon Highway north of Bell Road, and overflowed the highway."

"He reported that Dreamy Draw ran 5 feet deep under 16th Street just north of the Arizona Canal.

All of this water, plus other smaller washes and Cave Creek, itself, piled up behind the Arizona Canal and broke over into it.

GLENDENNING pointed out that there are 75 square miles of area unprotected by Cave Creek Dam that can dump floodwater against the Arizona Canal east of 35th Avenue. He described this area as one of the most critical in the Valley.

"And right now we have an application for a subdivision right where we would have to run a drainage structure," he said.

The Rains Will Come Again

A house by Dreamy Draw had two feet of water coursing through it in one of our recent storms. A house by a filled-in wash on Northern Ave. was left with a front corner hanging in air when the waters went down. Residents of a subdivision in the storm area were startled to find great tree trunks and old automobile frames in their front yards.

It will happen again. It could be a major disaster next time, or one of the times after that. Less than two inches of rain fell this time. As sure as taxes, there will be a day when the desert skies drop four inches, five inches or even six inches of water. Homes could go out like bridges in an ice jam.

Aeons ago the desert cut its washes to fit its cloudburst needs. Decades ago the old-timers learned: never camp in a wash; never build in a basin. Newcomers have all but forgotten their wisdom. Some of it, we don't need. Bulldozers fill in the basins and give us higher ground. That's good. But when bulldozers fill in the washes, we need desperately to remember what the old-timers knew — that next time the water comes roaring down, it will dig out the washes again.

There has been no really big rain since most of Phoenix's outlying subdivisions went in. There has been none since a majority of the city's present residents got here. Most of

our builders have never seen what the big storms can do. So too often they have filled and leveled the washes on the foothill slopes, with no drainage way to compensate, and put houses where the mountains have always wasted the rain they couldn't hold.

If a two-inch rain can sweep big trees down Dreamy Draw and carry junked automobile frames down lesser washes, it is clear what a four-inch cloudburst could do. In the most poorly conceived subdivisions, the runoff would fan out its mud and debris across the artificial flats, then dig in to create in a matter of minutes channels it would cost man millions and months to dig.

We have been lucky so far, but trusting to luck is not good enough. The newly created county flood control district provides the means for doing the big job, for preparing major wasteways. One thing is left. However it is done, by the flood control district or the planning and zoning commission, or by both in conjunction, respect must be established for the desert washes. None should be allowed to be filled in, by a subdivider or anyone else, without an adequate compensating drainage way being installed.

The alternative could cost billions in damage, and possibly lives as well.

1-14-60

Wet Cycle Revives Dam-Filling Contest

By BERT FIREMAN

As the Old Pioneer promised it would, rain has been falling over Arizona, once again averting the disaster of drouth. Now that the speculation about a spring flood on the Salt River is as thick as our January clouds, it is time for us to dust off (although that isn't the precise phrase) our abortive contest to pick the date when water again will flow over the spillways of Theodore Roosevelt Dam.



Up in Alaska they have widely-publicized pools on when the ice jam will break on the Tanana River. Since rain in the midst of our tourist season dampens the Chamber of Commerce's enthusiasm, we must do whatever we can to capitalize on the misfortune (to the tourist trade) of the fortunate (to farmers and teetotalers) rains. So we shall hold a preliminary or warm-up for the celebration that will be in order

when our reservoirs are filled again.

Louis Jurwitz, a weatherman with both a multitude of technical knowledge and a sense of humor, has already hoisted the warnings that water may be flowing steadily this spring in the Salt. He has had official checks made of the moisture content of the snowpack on the high mountains. Soaked ground, wet snow, and continuing storm conditions combine to support his belief that we'll have more water than we want before long.

Back in 1953 we had some good winter rains, although nothing like those of the recent storms. There were strong indications that the reservoirs might fill up, since there was a good carry-over of stored water from abundant rains in 1952. So in March of '53 we invited readers to guess the date when the spillways at the upper, oldest, and largest dam might overflow.

Nobody guessed right, because the rains stopped. In fairness to all who entered that contest we belatedly doff the fireman's hat to Mrs. L. G. Chalke of Casa Grande. She had the latest prediction (April 7, 1953) therefore was the closest to whatever date in the future that the overflow comes.

THE FACTS, FOLKS: Here are vital bits of information that you might like to program into your crystal ball or electronic computer:

In the last few wet years ('45, '49, '52, and '53) the maximum storage in the Salt River project reservoirs came during the second and third weeks of May.

The heaviest flow in recorded history down Salt River, Tonto Creek, and the Verde River was in 1905, when the runoff amounted to 5,200,000 acre feet — about 2½ times the present-day storage capacity of 2,076,000 acre feet.

Runoffs of 2 million acre feet in a single season have been recorded only 10 other times: 1890, 1891, 1906, 1907, 1915, 1916, 1919, 1920, 1932, and 1941.

Only once since 1941 have we come close to that magic figure. The wet winter of 1952 produced a runoff of 1,881,000 acre feet. The year 1958 started out wet but tapered off at 1½ million.

The last time water went through the spillways at Theodore Roosevelt Dam was on Easter Sunday, April 13, 1941.

OPEN TO ALL: There you have the important background information. Now you can consult your horoscope to determine the day and the hour water will leap from the spillways.

This corner will offer a suitable prize to the person whose guess is closest to the exact time. Anybody in Arizona is eligible but please file only one entry per person. My envelope opener is getting dull.

We won't promise what the prize will be. At the moment we are thinking along lines of a chrome-plated bailing bucket. There are good reasons for this. If the reservoirs do fill up and water starts running down the Salt, there may be flooded homes near the river anywhere between Lehi and Buckeye. The river channel is so filled with trees and brush that adjacent lands may become inundated. You may not live in a home near the low riverbed, but certainly you have a friend in the danger zone who might be happy to borrow the bucket.

Mail your entries to Under the Sun, Phoenix Gazette, P.O. Box 1950, giving the hour and day you think water will flow over the spillways of the big dam.

IRRIGATION EFFICIENCY 100%

Edward Pratt Uses Basin Irrigation To Get Penetration, Improve Yields, Save Water

EDDIE PRATT HAS subdued one of the most obstinate, contrary and all-round waterproof fields in Pinal County. It took stern measures to do it, though — absolute dead leveling.

The water intake rate on Pratt's south-of-Maricopa farm was so slow that he'd have been better off irrigating a brick. It didn't have much slope, but what little it had was too much.

When SCS-man Walt Parsons and Pratt first talked over the idea of levelling, Parsons held out for a little slope, at least. "But Walt," objected Pratt, "there's one thing you don't understand — I don't have ANY intake rate."

Pratt still doesn't have any intake rate, but now the water has to either soak in or evaporate. It can no longer run off. He split his half-section into 820 feet long and 1,100 feet wide fields. Or 1,100 feet long and 820 feet wide fields. It makes no difference really; he could bring his water in at the center and the result would be just the same.

Needless to say, irrigating is a

whole lot simpler now. He knows his well output and he knows his field size. A moment's multiplication and he knows how long he'll have to run to get four inches on. Once it's on it stays there.

Just 48 Inches

Pratt's records show that he used just 48 inches to grow cotton this summer, and he's all through irrigating for the year. The dead-level job cut his water requirement so much, he says, that he only pumped about half the time and lost his power rate advantage. Last year his pump was running full time.

The cost of the leveling was about \$80 per acre, minus \$30 ACP assistance. Says Parsons, "In this one year he should more than get his money back on the leveling and save about \$10 per acre water pumping costs."

Pratt's pumping cost is \$3.15 per acre foot — his total pumping outlay was \$16 per acre this year.

His other costs were relatively low too. Eddie's brother, Frank, is the only "outside" help used on the place, except for a cotton chopping



Stanfield-Maricopa and Casa Grande farmers take a look at the Pratt farm south of Maricopa during a recent irrigation-test tour. Better water intake, better cotton, lower water costs are some of the advantages that Pratt claims for his dead-level 20-acre fields.

crew. Most farmers in the county cultivate from four to eight times. Pratt cultivated only twice and did an adequate job of controlling weeds. Others dust from three to five times. Pratt watched his bugs carefully and didn't see the need of more than one insecticide application.

It's early to talk of yields, of course, but Pratt appears to have as promising an outlook on his prob-

lem fields as others do who have far fewer water penetrating problems. The boll count was 26.6 per foot of row on Aug. 1 and it was 31.4 on Sept. 1. Depending on which book you read, that means at least a two-bale crop and quite possibly three. At any rate, it looks a lot better than in the two previous years that Pratt has farmed it.

Pratt pre-irrigated with 12 inches of water in early March, planted on April 1 and irrigated with 5½ inches on May 6. The next irrigation was a month later. During July, Pratt irrigated on a two week cycle. "It never suffered," Pratt says. The story was quite the opposite on the sloping fields last year and the year before.

The boll count showed that Pratt may not have used enough fertilizer this time, even though he put on 123 pounds of nitrogen and 40 pounds of P205. This is the first time that has happened. Previously, the limiting factor was lack of water in the root zone in mid-season and late season.

Where he made the deeper cuts, the boll increase in August was 2.2 per foot. In the fill portions of the field it was much higher — about 10 bolls per foot.

To Reach The Loam

A few feet down Pratt has Gila loam — no problems with water intake there. But to reach the Gila loam, the water must first penetrate a couple of feet of clay loam — and there's the rub. He ran a ripper down the middles before the first irrigation and believes that helped some. His long range plans call for building up the organic matter content of the soil.

Parsons pointed out that dead-leveling can increase irrigation efficiency a great deal. It is quite usual for a farmer to put on nearly double the amount of water that he actually needs. Some soaks in, the rest runs off. "But when Pratt needs five inches, he puts on five inches," Parsons says.

The cost of waste water can easily amount to \$30 per acre. Parsons predicted that a lot of people will be dead-leveling waterproof soils or flattening slopes if they have some intake rate, just to stay in business. "You don't have the water?" Says Parsons, "You do if you irrigate like Pratt does."

—AFR—

BRATTLEBORO, VT. — The Holstein-Friesian Assn. of America states that a 15-year-old registered Holstein is history's first 300,000 lb. milk producer. She's Zeldenrust Pontiac Korndyke, owned by the Ray Bottema farm near Zionsville, Ind. And she's still milking heavily. She has 85 grandsons and 695 granddaughters registered in the Holstein-Friesian Herd Book.

—AFR—

PHOENIX — As forecast in the Farmer-Ranchman for Sept. 9, Coconino and Gila Counties have been designated as drought disaster areas. This means that they may buy sorghum grains at 75% of the county support level, but only for foundation herds. The price of grain fed to animals that are to be sold off the range is the support level.

MSSN TRIBUNE
9-24-62

Showers Get Big Welcome In Arizona

By United Press International

Rains generated by a tropical storm off the coast of Lower California brought welcome rains and dipping temperatures to much of Arizona over the weekend.

More rainfall was expected today, but the U.S. Weather Bureau in Phoenix warned that a drying trend in the next 48 hours was expected largely to end the rainy period.

Not a temperature report in Arizona showed 100 Sunday. Kingman with 91 and Yuma with 90 were the highs, while Phoenix dipped to 78, the lowest maximum in nearly five months.

Show Low had the highest precipitation report, .91 hundredths. Coolidge reported .71, McNary .75, and Winslow .42. Payson had 1.10 in 48 hours. Phoenix had .10.

Cities along the Colorado River and in southeastern portions of the state generally missed out on the showers. Yuma reported a trace.

WATERSHED RESEARCH REVIEWED

Some Advances In Brush Control, Revegetation, Increased Runoff, Capture Of Desert Flood Water

NO END IS IN SIGHT to Arizona's grim battle with chaparral, phreatophytes, evaporation, and other enemies that reduce the skimpy water supply of a state that was already perilously short even before its post-war population explosion.

But progress is being made in clearing the ranges of worthless woody plants, in getting that growth replaced with desirable ground cover to provide grazing, prevent erosion and induce infiltration. Progress is being made in recharging the underground by directing into wells or pits part of the desert runoff that is now mostly evaporated or wasted by vegetation of little or no value.

Researchers from federal and state agencies reported their investiga-

tions, and a few conclusions, at the fifth annual Watershed Symposium, sponsored by the Arizona Water Resources Committee and Watershed Management Division of the State Land Department.

Some of the most striking observations and forecasts were voiced by two laymen, one a non-official chemist and the other from the heavy equipment industry.

On The Desert Air

Jack W. Whiteman of the Empire Machinery Co., an Arizonan only three years away from damp Oregon, declared himself shocked by "this terrible waste of water." He referred to desert floods which Sol D. Resnick had previously explained are absorbed by surface soil or gravel

beds and soon dissipated into the sun-heated atmosphere.

Slowness of Arizonans to take positive steps toward removal of water-wasting vegetation was deplored by Mr. Whiteman. He referred to the Middle Gila clearing project, estimated to save 19,000 acre-feet a year, which still hangs fire because of intra-state disagreements even though its cost has already been appropriated by Congress. Many other opportunities for water-saving exist under the Small Projects Act.

On the other hand, Mr. Whiteman admitted that it is largely up to the "earth-moving industry" to devise better equipment for cheaper shrub and juniper removal, as well as for construction of dams and water-spreading dikes. One advance in that direction may be the "tree cutter," a big blade mounted on a crawler tractor that slices off big junipers at the ground level. Slides were shown of operations near Drake, where a heavy stand of junipers was taken out for \$3.50 an acre.

Don Lillie of the Agricultural Research Service had testified that the problem of chaparral is mainly a turbinella oak problem. John H. Kirsh, woody plant specialist of Amchem Products, Inc., predicted that the solution will lie along chemical lines and not with the discovery of new chemicals but "new formulations of those we already have."

Results with 2,4,5-T and its relatives, in ester and amine form, were reviewed. Greatest success is attained with the low-volatility oil-soluble amines.

Tenacious Roots

Killing turbinella above ground is not too difficult, according to Lillie. But killing the roots with any foliage application is next to impossible; sprouts shoot up and soon the turbinella is as thick as ever. "So we are exploring the soil," Lillie said, meaning that extensive trials in field and greenhouse are being made with preparations such as Fenuron that permeate the earth and get at the roots.

George Glendenning's story was also a turbinella story, largely. As research forester for the Rocky Mountain Forest and Range Experiment Station, at Tempe, he reviewed six years of work on the Three-Bar ranges west of Roosevelt Lake. Direction of that research had to be drastically changed in 1959 after a bad fire devastated that area. Erosion was enormously increased, usable runoff not very much. These fire results were foreseen and the goal is now to get ground cover of some desirable type established. Several large tracts have been laid out for different types of treatment and it is going to be some time before any recommendations can be made.

It's A Root Plow Job

Floyd Pond, range conservationist for the Rocky Mountain Station, discussed mechanical control of chaparral on the Pinal burn south of Globe, in the Tonto Springs vicinity, and elsewhere. The root plow, later pictured by Whiteman, is the only device that has been completely successful, and it can't be used in the roughest locations. Everywhere the lesson was, "the more complete the kill, the more grass." No grass competes long with scrub oak.

Carl R. Wilder, regional conservation engineer of the Portland Cement Assn., showed pictures and spoke on the use of concrete in irrigation, to save water and reduce labor. He mentioned one Nebraska system where the zanjeros deliver water only half the year, make and install portable irrigation structures the other half. The emphasis of his remarks, however, was on the possibilities of "soil cement," an inexpensive and surprisingly durable mixture of cement with earth dig right at the site.

Slight Water Saving

Douglas Lewis of the U. S. Geological Survey made the first full report on the Cottonwood Wash project in Mohave County. A mile and a quarter of Cottonwood Wash, just above its junction with Big Sandy, was cleared of cottonwoods, batamotes and other riparian vegetation, or else the trees were defoliated. Object was to observe the effect on stream flow. Day-night fluctuation of groundwater almost ceased, and there was some saving of water but not enough to justify treatment. Lewis advanced the opinion that evaporation from the unshaded ground was greater than had been estimated. Although the experiment could not be called a success, much valuable data was obtained.

Robert V. Keppel was unable to speak in person on the hydrology of semi-arid ranges and the investigations now under way on the Walnut Creek watershed east of Tombstone. His address was delivered by J. Linton Gardner. The talks of Sol Resnick on recharge, George W. Heddon on Indian reservation brush control, and Kel Fox on mine water, are digested elsewhere in the Farmer-Ranchman — or will be as soon as there's space.

Three Routes To Aquifer Recharge, Drawbacks To All

RECHARGING groundwater through gravel pits is no simple matter of turning surface water into the pit and letting it seep away. Soon the bottom is more or less sealed by colloids and sediment, and possibly by bacterial growth as well. Infiltration is blocked.

So there is many a chemical problem to be solved, and possibly problems of electrical charge as well, before any pit recharge technique can be recommended.

Sol D. Resnick, U. of A. hydrologist, reported as much at the annual Watershed Symposium, Sept. 20. George Maddox was down as co-author of the paper but he was so busy solving some of the difficulties mentioned that he couldn't attend.

Maddox was renewing recharge experiments beside the Maricopa County Municipal Water Conservation District canal, west of Beardsley, where there are a number of large gravel lenses close to the surface. (AFR, July 1, 1961).

A general aim there is to attain infiltration as rapid as at Peoria, Ill., where there are four pits of one-seventh-acre area, each of which takes in five acre-feet a day. At Beardsley, the highest rate attained is about 60% of that, and it drops off to still less after a few days.

Colloids and sediment tend to collect in a thin film over the gravel, and perhaps bacteria contribute to this film. It is not understood why the solids aren't distributed through more of the upper gravel. Chlorination would kill the bacteria, but that would be expensive treatment for desert flood waters and the Arizona Experiment Station is looking for something cheaper.

Wells And Spreaders

Recharge through wells and by water spreading were discussed. Water injected into wells must also be chlorinated or otherwise treated, and no sure way to keep the solids from clogging aquifers has yet been devised. Spreading has been tried very little in Arizona but Resnick thinks it warrants full investigation. Possibility of using nuclear explosions to loosen underground formations and make them more permeable was suggested. The bed of the Santa Cruz was mentioned as one suitable place for a test.

Anyway, the need for getting desert floods into underground storage is growing more imperative by the hour. As it is, those waters are mostly lost to evapotranspiration. And the groundwater bank is being drawn upon at the rate of 5,000,000 acre-feet a year, of which not more than 1,000,000 is replenished. There is scientific evidence that most of our groundwater has been right where it is for 10,000 to 30,000 years.

WITH HELP FROM USGS—

U. Of A. Hydrology Dept. In Auspicious Start With Matalas, Skibitzke, Ferris On Faculty

THREE OF THE WORLD'S best-informed and most experienced hydrologists, on loan from the U. S. Geological Survey, are serving as instructors and lecturers in the new hydrology department that has been set up at the University of Arizona under Dr. John W. Harshbarger.

Herbert Skibitzke, whose specialty is analog studies of groundwater movement, commutes between his Phoenix home and Tucson. Dr. Nicholas Matalas and John G. Ferris are temporarily transferred from Washington to Tucson.

The loan of these specialists is an indication of intense desire on the part of the USGS to see the U. of A. program, first of its kind, get off to a successful start.

Tom Maddock, Jr., chief of the Survey's general hydrology branch in Washington, says that for several years the agency has considered offering help to universities in developing curricula that would lead to B.S., M.S. and Ph.D. degrees in sci-

entific hydrology. Now the U. of A. is leading the way toward some relief of the universal scarcity of trained hydrologists in a water-short world.

The study program put together by Dr. Harshbarger and his associates is certainly ambitious. It embraces six courses: field hydrology, hydrologic systems, dynamics of flow systems in the earth, continental hydrology, analog model analysis of hydrologic systems, and mathematical statistics in hydrology.

But where to get instructors? That was the big question, and there were some opinions that Dr. Harshbarger was shooting too high. For men able to teach the various branches of a complex science are even scarcer than qualified hydrologists.

One Year, Maybe Five

Aid from the USGS solved that problem. For this academic year, the time and energy of Dr. Matalas, Skibitzke and Ferris will be devoted mainly to getting the first university hydrologic program well established. Maddock has given assurance that instructors will be supplied, at least on a part-time basis, for three to five years. This will give the U. of A. opportunity to organize its own staff.

Dr. Matalas is from the USGS surface water branch, and recently has become deeply involved in studies aimed at relating tree growth to stream flow. Even before his transfer he had spent considerable time in the U. of A. Dendrochronology Laboratory, studying the tree ring records assembled by Dr. Andrew Douglass, Dr. Edmund Schulman, and others.

Ferris is from the groundwater branch and is now writing a book on quantitative methods of groundwater distribution. Continental hydrology is the main course he is teaching.

The work of Skibitzke, in building analog models to simulate the flow of groundwater through different formations, has had considerable mention in Arizona Farmer-Ranchman. His achievements, and his discoveries regarding the almost inconceivable slowness of groundwater movement, have won him fame among scientists all over the globe.



ARIZ Ranch

WATER FOR THIRSTY CATTLE

Catchments Waterproofed By Lab Tester For Dime A Yard; Annual Cost Of Two Cents Foreseen

WATERPROOFING OF soil for catchment structures such as stock-water ponds on ranges, at a yearly cost of only two cents a square yard, is foreseen by Lloyd E. Myers, director of the U. S. Water Conservation Laboratory in Salt River Valley. That goal has not been reached but is distinctly in sight.

Director Myers has written for the highly technical Journal of Soil and Water Conservation a detailed review of experiments in low-cost precipitation structures that began about the time the Laboratory was dedicated, in October of 1959. As the project progressed, many a corner was cut and techniques were steadily simplified.

The next step may be just to treat the natural surface, with no attempt at leveling it. Leveling has added to costs so far.

Simpler, faster application of materials is also an immediate possibility. In the machine shop back of the laboratory, a sprayer with a 20-foot boom is being fabricated.

Of course it is improbable that any rangeman will want to own such a machine. More likely, custom operators may be hired to treat a catchment area adjacent to every tank on the ranch.

Porous soils often soak up so much precipitation that only a heavy storm will produce enough runoff to fill tanks. There are quite a few catchments through the Southwest, but high costs are a drawback. Hot asphalt, plastic films, metal sheeting, asphalt mats and concrete have been used, but "the cost for reasonably satisfactory structures has exceeded \$1 a square yard."

For Nothing — Or Almost

Because of this cost factor, the Laboratory's tests have been confined to sprayable materials. "Results to date have been good and large-scale field tests are under way on a treatment which promises to produce catchment structures for annual costs approaching two cents per square yard," Director Myers wrote. "Assuming 80% recovery, a 1,000-yard area costing \$20 would produce 45,000 gallons of water from ten inches of rainfall. This is quite reasonable for the development of stock-water supplies on arid rangelands."

The research has been both in the laboratory and in the field, near Granite Reef. Among the factors to be considered are "mechanical strength of treated soils, depth of treatment penetration, optimum dosage rates, reactions with salts in the soil, reactions with other chemicals involved in the treatment."

Sometimes trays of treated soil, 30x36 inches, are sprayed with water to simulate rain, and the water caught is measured. Then again, runoff from treated areas in the field is measured and compared with that from untreated soil, also from plots covered with butyl rubber sheeting that captures all the rain.

Erosion And Weeds

It soon became apparent that it was necessary not only to waterproof the soil, but also to stabilize it against erosion and to prevent weed growth. Several moisture-repellent compounds, including certain silicones, were found suitable for low-cost waterproofing. "About \$10 worth of these materials will temporarily waterproof an acre of sand.

Unfortunately, a water-repellent soil particle will float unless it is tied down or covered up, and so the treatment created a terrific erosion problem. The most effective low-cost stabilizers evaluated to date have been sprayable asphalt emulsions.

"Although the emulsions are applied at low rates, and do not form a completely watertight film, they still serve as an effective moisture-conserving mulch when sprayed on the soil surface. A fine crop of weeds develops rather rapidly unless a soil sterilant, such as polyborchlorate, is used.

"The complete treatment now under field conditions involves three separate spray applications: first, a soil sterilant; second, an asphalt emulsion; and third, a water-repellent chemical."

Director Myers adds that the cost of this procedure is two cents a square yard for sterilant, two to five cents for asphalt, one for repellent. Site preparation costs will vary widely but it is believed that under average conditions the first treatment will run around ten cents a yard. Durability is still to be proved but Myers is rather confident of getting the annual cost down to two cents.

PHOENIX TRIBUNE
9-24-62

Showers Get Big Welcome In Arizona

By United Press International

Rains generated by a tropical storm off the coast of Lower California brought welcome rains and dipping temperatures to much of Arizona over the weekend.

More rainfall was expected today, but the U.S. Weather Bureau in Phoenix warned that a drying trend in the next 48 hours was expected largely to end the rainy period.

Not a temperature report in Arizona showed 100 Sunday. Kingman with 91 and Yuma with 90 were the highs, while Phoenix dipped to 78, the lowest maximum in nearly five months.

Show Low had the highest precipitation report, .91 hundredths. Coolidge reported .71, McNary .75, and Winslow .42. Payson had 1.10 in 48 hours. Phoenix had .10.

Cities along the Colorado River and in southeastern portions of the state generally missed out on the showers. Yuma reported a trace.

MESA TRIBUNE
August Rain
9-6-63
Near Record

PHOENIX (UPI)—August was one of the wettest months on record in Arizona, the U.S. Weather Bureau said Thursday.

Early provisional totals from a representative group of reporting stations indicated the statewide average rainfall probably will be more than five inches.

The average from 35 stations was 5.44 inches. The only other months exceeding five inches since records were started in 1895 were February of 1905 with 5.29 inches and November of the same year with 5.49 inches.

Highest total for August was 12.45 inches at the Natural Bridge near Payson. This was followed by 11.29 inches at Young and 10.49 inches at Payson.

Sky Harbor Airport reported 2.68 inches for the month, which was more than twice the average rainfall.

Other totals in August were Flagstaff 4.96, Williams 8.82, Globe 8.10, Miami 8.08, Paradise Valley 2.56, San Manuel 7.48, Ajo 4.27, Benson 7.19, Prescott Airport 4.27, Tucson Airport 2.71, and Douglas 2.05.

Ranges are green over the entire state and water holes are filled in most areas, the weather bureau said. Only Yuma and Mohave Counties missed out on heavy rainfall totals. However spotty heavy rainfall did occur in some sections of those two counties.

3-11-64 Tempe Daily News

City Council Will Act On Water Bids

J. H. Welsh & Son Low Bid For Work \$446,000; New Reservoir, Main Installations Included

Although the agenda for Thursday's first March meeting of the city council is rather lengthy, probably the major item will be the award of a \$446,597 water system improvement contract to be done with bond funds approved last year.

The council session is set for 7:30 p.m., Thursday, at city hall.

J. H. Welsh & Son, Phoenix, was the lowest of several contractors who bid on the water system extensions and improvements. The firm has done several jobs for the city.

The project includes, in addition to major water mains, installation of a two-million gallon reservoir on Double Buttes at the southwest section of the city. In addition to "beefing up" supply and pressure in the area, the new tank would up by 50 percent the city's storage capacity. Float controls will be installed on the city's one-million gallon northside reservoir.

Chief among the main jobs is the line across Salt River at Rural-Scottsdale road. This would be a 30-inch diameter and is engineered for later use when the surface water filtration plant is completed in Papago park.

Other lines are on North College avenue, McKellips road, and Broadway. The McKellips road work will tie the system into a Salt River Project well which the city will use next summer. Reports are the water quality is superior to that presently jumped into the city system.

John Carolla Engineers are the consultants for the water system improvements.

A zoning appeal, hearing and date-setting are to be handled. F. M. and J. H. Coker are appealing a Planning & Zoning Committee rejection of C-2 and R-4 zoning for property on the city's westside. There will be a hearing for T. D. Bergen's requested I-2 zoning of property on West Eighth at 48th street, the city limits. Bradley Construction Co. asks a hearing (set March 26) for R-2 to R-3A zoning in Laguna Estates, Southern and Kyrene drive.

A final plat of Palmcroft Manor No. 9 (24 lots) will be submitted by K & W Construction Co. and the final plat of

Palo Verde Industrial Park, now in development, is due to consideration.

Mayor Harold Andrews will formally notify the council of a joint meeting with the City

(Continued on Page 5)

Council

(Continued from Page 1)

of Phoenix council March 25 at the Sands hotel. Tempe will host the session which will discuss flood control, airport plans and freeway routes, all of mutual interest.

Public Works Director Lou Scherer will make a brief report on the many projects underway in the city, some being done directly by PW crews.

Manager Lou Cooper said the council will receive, for initial consideration, Ordinance 413, which would amend Ordinance 403 to permit credit to subdivision developers on water meter installations if the developers install water taps in mains when the lines are put in place. Cooper said the developers actions would save the city water department crews many man hours of work and that the credit allowance is fair.

Final apportionment of a \$7,500 settlement by the C. V. Miller Co., a firm which did not execute a contract with the city on a sewer project which it was low bidder on, will be asked. The Miller firm bid low on District 65, the lines north of Apache and east of McClintock drive.

Two liquor license applications, one an original, will be considered. Snide's House of Pizza, 20 East Seventh street, seeks a No. 8 for retail beer.

hensive Flood Control Program Report on November 20, 1963, at the public hearing by the Board of Supervisors was in accordance with the laws of Arizona, and the result of many years of planning and study by qualified engineers, consulting engineering firms, federal agencies, state and county agencies, members of the Advisory Board of the Flood Control District, the Consulting Group of the District, and the Board of Directors (the Board of Supervisors) of the Flood Control District. Many of these people and agencies performed these studies with no recompense and at no cost to the County taxpayer.

It was the consensus of opinion of the engineers and civic leaders present at the public hearing that this program was an extremely well - planned and factual program and one that is required and needed for the continued growth of Maricopa County.

JOHN F. FISHER, Chairman
Citizen's Advisory Board
Flood Control District

ARIZ. JOURNAL ***
Flood Control Dist.

Dear Editor: 2-1-64

As chairman of the Citizen's Advisory Board of the Flood Control District, and on behalf of the members, it is felt that your editorial dated December 12, titled "Local Flood Project or the CAP?" is very much lacking in research or concern as to the facts regarding the subject of local flood control projects.

For your information, an individual appeared before the public hearing on November 20, 1963, and made the same unfounded statements regarding the duplication of flood control projects in the Central Arizona Project.

The Bureau of Reclamation has endorsed the Flood Control Program as being necessary and desirable for the orderly expansion of and development of Maricopa County. The state office of Bureau of Reclamation has detailed knowledge of the plans being formulated by the Flood Control District and, by working in close cooperation, is keeping the Flood Control District aware of the progress of the plans for the CAP. The successful completion of the flood control program will have no adverse effect upon the CAP. A study of both programs will reveal they benefit each other both physically and economically. This was confirmed by a representative of the Bureau of Reclamation at the public hearing and is recorded in the transcript of the hearing on November 20, 1963.

Prior to the public hearing, one of the objectors advised the Chief Engineer of the Flood Control District that he thought the flood control program was a necessary instrument, but the approval should be delayed until after a tax equalization bill had been put through the state legislature. At the public hearing, those present were given an opportunity to state their opinions. The record of the hearing reveals one objector stated: "I know nothing about flood control." This same person and one other stated they had neither read nor studied the flood control program report to which they were objecting.

The adoption of the Compre-

Gazette
4-1-64 The Phoenix

Flood Plan Bond Issue Year Away

A multi-million dollar bond issue to finance a countrywide flood control program has been tentatively scheduled for next year by the county board of supervisors.

County Manager Charles W. Miller said a proposed 1964 date for the bond election was found to be unfeasible because of a need for further appraisal of project costs.

Latest estimates from the U.S. Army Corps of Engineers and the Maricopa County Flood Control District set total cost at approximately \$105 million, with up to \$18.5 million to be paid by the county. Balance of the cost would be covered by federal funds.

The bond election date will be officially set by the supervisors after the Flood Control Advisory Board has had an opportunity to study all aspects of the proposed program and submit recommendations, Miller said.

Streets Flooded From Rain Runoff

PHOENIX GAZETTE 8-1-64

Better MESA TRIBUNE Crossing 8-4-64 Asked

Improvements on N. Country Club Dr. at the Salt Riverbed to provide an "all - weather" crossing were requested by Mesa City Council at its meeting last night.

The request was prompted by blocking of the crossing Saturday and part of Sunday by flood waters following heavy weekend rains.

Council agreed to ask the State Highway Department to install drain culverts or some other means of keeping the roadway dry during flooding conditions. The highway is heavily traveled by Mesans en route to Scottsdale and north Phoenix.

Crossing Approved

MESA—The Arizona Highway Department will be asked to make all-weather crossings where North Country Club Drive, Hayden and Scottsdale roads span the Salt River.

The City Council Monday agreed on the request, noting that even a little rain floods the roads, requiring traffic to reroute through Tempe to get to McDowell.

The council also gave final passage to a \$5.6 million budget for 1964-65.

EVENING AMERICAN
8-4-64

Highways Closed To Traffic

Runoff from widespread Valley showers today flooded nearly a dozen streets and highways and temporarily blocked traffic to Payson. More rain is predicted through tomorrow.

Rain which brought relief to dry rangelands and forests also carried threats of dangerous flash floods to many areas of the state.

The sheriff's office said the Phoenix-Payson Highway was blocked at the McDowell Road intersection because of overflow further north at the Arizona Canal.

WATER ALSO WAS reported over the highway at the Verde River. The Bush Highway from Mesa to Saguaro Lake also was closed.

North Country Club Drive in Mesa was closed at the Salt River. Water in the normally dry stream came from over-

Picture on Second Front Page

flow from the Arizona Canal, and from the Salt River Project opening gates at Granite Reef Dam.

POLICE CLOSED 48th Street at the Salt River crossing, and water was reported flowing across 40th Street.

Williams Field Road at Lindsay Road was flooded, and water ran from curb to curb on McKellips Road north of Mesa.

On the west side of the Valley, water swirled over Indian School, Thomas and McDowell Roads at the Agua Fria River. To the north, Bell Road west of Cave Creek Road was flooded.

PHOENIX POLICE said 76 accidents occurred on the city's streets in a 24-hour period. The higher - than - normal accident count was blamed in part on rain-slick streets.

Crossings of New River west of Phoenix also were flooded, as were most of the unpaved roads in Paradise Valley.

A heavy burst of rain this morning left water running curb to curb in some Mesa streets.

By midmorning no property damage from rain had been reported by utility companies and police.

ON THE NAVAJO Indian Reservation near the village of Chinle, six persons, and pos-

agreed to ask the
ay Department to
culverts or some
ans of keeping the
y during flooding
The highway is
led by Mesans en
ttsdale and north

agreed on the request, noting
that even a little rain floods
the roads, requiring traffic
to reroute through Tempe
to get to McDowell.
The council also gave final
passage to a \$5.6 million
budget for 1964-65.

EVENING AMERICAN
8-4-64

over the highway at the Verde
River. The Bush Highway from
Mesa to Saguaro Lake also was
closed

North Country Club Drive in
Mesa was closed at the Salt
River. Water in the normally
dry stream came from over-

Picture on Second Front Page

flow from the Arizona Canal,
and from the Salt River Project
opening gates at Granite Reef
Dam.

POLICE CLOSED 48th Street
at the Salt River crossing, and
water was reported flowing
across 40th Street.

Williams Field Road at Lind-
say Road was flooded, and
water ran from curb to curb on
McKellips Road north of Mesa.

On the west side of the Val-
ley, water swirled over Indian
School, Thomas and McDowell
Roads at the Agua Fria River.
To the north, Bell Road west of
Cave Creek Road was flooded.

PHOENIX POLICE said 76
accidents occurred on the city's
streets in a 24-hour period. The
higher-than-normal accident
count was blamed in part on
rain-slick streets.

Crossings of New River west
of Phoenix also were flooded,
as were most of the unpaved
roads in Paradise Valley.

A heavy burst of rain this
morning left water running curb
to curb in some Mesa streets.

By midmorning no property
damage from rain had been re-
ported by utility companies and
police.

ON THE NAVAJO Indian
Reservation near the village of
Chinle, six persons, and pos-
sibly seven, were swept to their
deaths when their car plunged
into a swollen wash after a
bridge washed away.

The U.S. Weather Bureau said
only two cities in the state —
Kingman and Page — reported
no precipitation.

Rainfall in Phoenix measured
.17 of an inch for the 27 hour
period ended at 8 a.m. today
and more is forecast.

VALLEY RESIDENTS can ex-
pect numerous showers, some
heavy, through tomorrow night.

Since showers started early
Wednesday morning precipita-
tion at Sky Harbor Airport has
measured .28 of an inch.

The sheriff's office reported a
bridge out at Elliott Road and
the Highline Canal, near 56th
Street. Water was reported over
roads at 91st Avenue and Peoria
and at Glendale Avenue and El
Mirage Road. Water was over
Cave Creek Road in several
places.

TEMPERATURES in desert
areas plunged 15 to 20 degrees
from normal under heavy
clouds.

Major rainfall in the state in-
cluded Williams, 1.20 of an
inch; Ajo, .92; Ft. Huachuca,
.98; Globe, .44, and Payson, .63.

Other readings included Buck-
eye, .21; Carefree, .63; Cotton-
wood, .21; Flagstaff, .19; Gila
Bend, .12, and Grand Canyon,
.09.

PRESCOTT REPORTED .04;
Springville, .37; Tucson, .27;
Winslow, .03, and Yuma, .02.

Streets Flooded From Rain Runoff

PHOENIX GAZETTE 8-1-64

Better MESA TRIBUNE Crossing 8-4-64 Asked

Improvements on N. Country Club Dr. at the Salt Riverbed to provide an "all-weather" crossing were requested by Mesa City Council at its meeting last night.

The request was prompted by blocking of the crossing Saturday and part of Sunday by flood waters following heavy weekend rains.

Council agreed to ask the State Highway Department to install drain culverts or some other means of keeping the roadway dry during flooding conditions. The highway is heavily traveled by Mesans en route to Scottsdale and north Phoenix.

Crossing Approved

MESA—The Arizona Highway Department will be asked to make all-weather crossings where North Country Club Drive, Hayden and Scottsdale roads span the Salt River.

The City Council Monday agreed on the request, noting that even a little rain floods the roads, requiring traffic to reroute through Tempe to get to McDowell.

The council also gave final passage to a \$5.6 million budget for 1964-65.

EVENING AMERICAN
8-4-64

Highways Closed To Traffic

Runoff from widespread Valley showers today flooded nearly a dozen streets and highways and temporarily blocked traffic to Payson. More rain is predicted through tomorrow.

Rain which brought relief to dry rangelands and forests also carried threats of dangerous flash floods to many areas of the state.

The sheriff's office said the Phoenix-Payson Highway was blocked at the McDowell Road intersection because of overflow further north at the Arizona Canal.

WATER ALSO WAS reported over the highway at the Verde River. The Bush Highway from Mesa to Saguaro Lake also was closed.

North Country Club Drive in Mesa was closed at the Salt River. Water in the normally dry stream came from over-

Picture on Second Front Page

flow from the Arizona Canal, and from the Salt River Project opening gates at Granite Reef Dam.

POLICE CLOSED 48th Street at the Salt River crossing, and water was reported flowing across 40th Street.

Williams Field Road at Lindsay Road was flooded, and water ran from curb to curb on McKellips Road north of Mesa.

On the west side of the Valley, water swirled over Indian School, Thomas and McDowell Roads at the Agua Fria River. To the north, Bell Road west of Cave Creek Road was flooded.

PHOENIX POLICE said 76 accidents occurred on the city's streets in a 24-hour period. The higher-than-normal accident count was blamed in part on rain-slick streets.

Crossings of New River west of Phoenix also were flooded, as were most of the unpaved roads in Paradise Valley.

A heavy burst of rain this morning left water running curb to curb in some Mesa streets.

By midmorning no property damage from rain had been reported by utility companies and police.

ON THE NAVAJO Indian Reservation near the village of Chinle, six persons, and possibly seven, were swept to their deaths when their car plunged into a swollen wash after a bridge washed away.

The U.S. Weather Bureau said only two cities in the state — Kingman and Page — reported no precipitation.

Rainfall in Phoenix measured .17 of an inch for the 27 hour period ended at 8 a.m. today and more is forecast.

VALLEY RESIDENTS can expect numerous showers, some heavy, through tomorrow night.

Since showers started early Wednesday morning precipitation at Sky Harbor Airport has measured .28 of an inch.

The sheriff's office reported a bridge out at Elliott Road and

MESA TRIBUNE
Crossing
8-4-64
Asked

Improvements on N. Country Club Dr. at the Salt Riverbed to provide an "all-weather" crossing were requested by Mesa City Council at its meeting last night.

The request was prompted by blocking of the crossing Saturday and part of Sunday by flood waters following heavy weekend rains.

Council agreed to ask the State Highway Department to install drain culverts or some other means of keeping the roadway dry during flooding conditions. The highway is heavily traveled by Mesans en route to Scottsdale and north Phoenix.

Crossing Approved

MESA—The Arizona Highway Department will be asked to make all-weather crossings where North Country Club Drive, Hayden and Scottsdale roads span the Salt River.

The City Council Monday agreed on the request, noting that even a little rain floods the roads, requiring traffic to reroute through Tempe to get to McDowell.

The council also gave final passage to a \$5.6 million budget for 1964-65.

EVENING AMERICAN
8-4-64

To Traffic

Runoff from widespread Valley showers today flooded nearly a dozen streets and highways and temporarily blocked traffic to Payson. More rain is predicted through tomorrow.

Rain which brought relief to dry rangelands and forests also carried threats of dangerous flash floods to many areas of the state.

The sheriff's office said the Phoenix-Payson Highway was blocked at the McDowell Road intersection because of overflow further north at the Arizona Canal.

WATER ALSO WAS reported over the highway at the Verde River. The Bush Highway from Mesa to Saguaro Lake also was closed.

North Country Club Drive in Mesa was closed at the Salt River. Water in the normally dry stream came from over-

Picture on Second Front Page

flow from the Arizona Canal, and from the Salt River Project opening gates at Granite Reef Dam.

POLICE CLOSED 48th Street at the Salt River crossing, and water was reported flowing across 40th Street.

Williams Field Road at Lindsay Road was flooded, and water ran from curb to curb on McKellips Road north of Mesa.

On the west side of the Valley, water swirled over Indian School, Thomas and McDowell Roads at the Agua Fria River. To the north, Bell Road west of Cave Creek Road was flooded.

PHOENIX POLICE said 76 accidents occurred on the city's streets in a 24-hour period. The higher-than-normal accident count was blamed in part on rain-slick streets.

Crossings of New River west of Phoenix also were flooded, as were most of the unpaved roads in Paradise Valley.

A heavy burst of rain this morning left water running curb to curb in some Mesa streets.

By midmorning no property damage from rain had been reported by utility companies and police.

ON THE NAVAJO Indian Reservation near the village of Chinle, six persons, and possibly seven, were swept to their deaths when their car plunged into a swollen wash after a bridge washed away.

The U.S. Weather Bureau said only two cities in the state — Kingman and Page — reported no precipitation.

Rainfall in Phoenix measured .17 of an inch for the 27 hour period ended at 8 a.m. today and more is forecast.

VALLEY RESIDENTS can expect numerous showers, some heavy, through tomorrow night.

Since showers started early Wednesday morning precipitation at Sky Harbor Airport has measured .28 of an inch.

The sheriff's office reported a bridge out at Elliott Road and the Highline Canal, near 56th Street. Water was reported over roads at 91st Avenue and Peoria and at Glendale Avenue and El Mirage Road. Water was over Cave Creek Road in several places.

TEMPERATURES in desert areas plunged 15 to 20 degrees from normal under heavy clouds.

Major rainfall in the state included Williams, 1.20 of an inch; Ajo, .92; Ft. Huachuca, .98; Globe, .44, and Payson, .63.

Other readings included Buckeye, .21; Carefree, .63; Cottonwood, .21; Flagstaff, .19; Gila Bend, .12, and Grand Canyon, .09.

PRESCOTT REPORTED .04; Springerville, .37; Tucson, .27; Winslow, .03, and Yuma, .02.



Gazette Staff Photo by Lloyd Clark

PHOENIX GAZETTE 7-30-64 **RAIN RUNOFF FLOODS STREET**

Rain early this morning sent runoff from Lookout Mountain area (left) flooding into Seventh Street south of Bell Road.

July Wet, August to Be Wetter

By United Press International

Parts of Arizona had one of the wettest Julys in recent years, according to the Weather Bureau's provisional rainfall report for the month.

Cottonwood, in the Verde Valley, led the list with a total of 9.90 inches, followed by Fort Huachuca with a total of 7.94 inches.

Some other July rainfall totals included 5.18 inches at Douglas Airport; 5.16 inches at McNary; 5.03 inches at Flagstaff Airport;

4.99 at Bisbee; 4.79 at Maverick; 4.58 at Tucson Airport and 3.80 inches at Horseshoe Dam.

The Weather Bureau said the showery weather probably will continue for the next 24 hours over most of the state as a result of moisture saturation from the surface to the 30,000-foot level.

During the past 24 hours, heavy rains were reported in Flagstaff, Bisbee, Tucson and along the Mogollon Rim.

Parts of Flagstaff had an estimated 3 inches of rain in an hour late Thursday, although the official airport total was only 1.21 inches. Runoff from the storm flooded streets and underpasses, and caused considerable damage to homes and businesses.

Tucson Airport had an official 1.09 inches and heavier amounts fell in other parts of the city. A thunderstorm in the Rincon Mountains sent a four-foot wall of water rushing down Pantano

Wash this morning and residents along the stream were alerted by sheriff's deputies. However, the runoff was diverted before it reached heavily populated areas of the city.

The Weather Bureau noted today that August is the state's rainiest month. Motorists were cautioned to take extreme precautions when crossing dips because of the danger of flash floods, especially in the desert areas. Motorists on mountain roads were urged to watch for rock slides.

MESA TRIBUNE

7-31-64

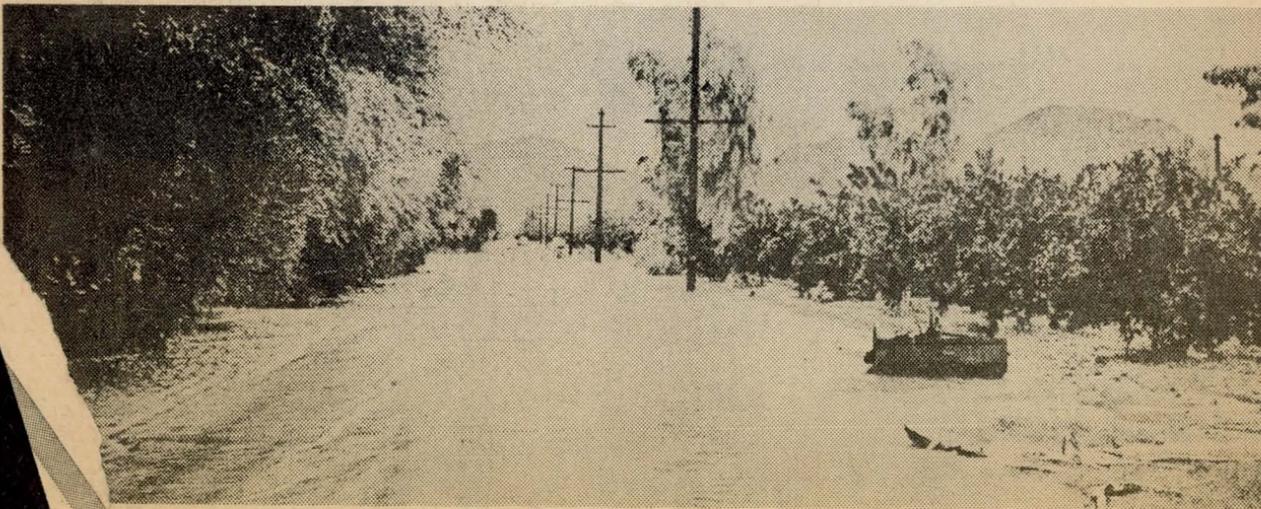
Friday, January 29, 1965

Section Two, Pages 21 to 38

Floods---They Can And Do Happen In Valley Of Sun



Floodwaters in 1943 engulfed this home near Seventh Avenue, south of Northern. The flood extended over to 19th and 23 avenues and as far south as the Grand Canal. Much of area was farm or undeveloped land at time.



This shows a flood scene in 1943, looking north on Seventh Avenue, north of Northern.

For most newcomers, a flood in Phoenix is almost impossible to visualize.

Fred Glendening, city public works director, recall "floating on log rafts in Glendale in 1921." That was a bad flood, he said, "and so was one in 1943, when water swept down over the Cave Creek Dam and covered a lot of what is now residential northwest Phoenix."

WHAT WAS farm land then now comprises a vast district of thousands of homes. "The flood water in 1943," he said, "generally covered what is now north Phoenix from Seventh Avenue over to 23rd Avenue. Damage to farm land was ex-

tensive, but a flood there now would cost millions of dollars."

Glendening is an advocate of the proposed Maricopa County flood control project.

Along with Mayor Milton Graham, City Manager Robert Coop and Supervisors Ruth O'Neil, Barney Burns and Pat Riggs, Glendening appeared before the U.S. Budget Bureau in Washington today to argue the city and county case for approval of the flood control project. The group got assurances yesterday from the U.S. Army that the project would be rushed through to the budget bureau in an attempt to secure congressional action this year.

THEY WILL seek early approval of phase B, which calls for flood channels and dams on the perimeter of Phoenix—Cave Creek, Skunk Creek, New River, Agua Fria River, and the Arizona Canal.

Why build dams or channels 10 miles out of Phoenix on New River or the Agua Fria? "The idea is to detain the water let it come out slowly," said Glendening. "Channelizing the Agua Fria is common sense, because we will then have a good place for the water to go. If we don't in some cases the flood waters could break across Cave Creek, across Bell Road, threaten Moon Valley and much more."

Phoenix Gazette

April 21, 1965



Heavy late snow on San Francisco Peaks shown here promises later than usual skiing at Arizona Snow Bowl near Flagstaff. View, with Black Bill Park and Doney Park beyond

peaks, was taken by Dick Enz, snow survey chief of U.S. Soil Conservation Service. One snow course measured for runoff forecasts held 32 inches of water.

Phoenix Gazette

April 21, 1965



Potential snow avalanches on San Francisco Peaks near Flagstaff are being blasted loose by U.S. Forest Service to make

runs below safe for skiers. Picture is of west slope of Agassiz Peak.

Phoenix Gazette

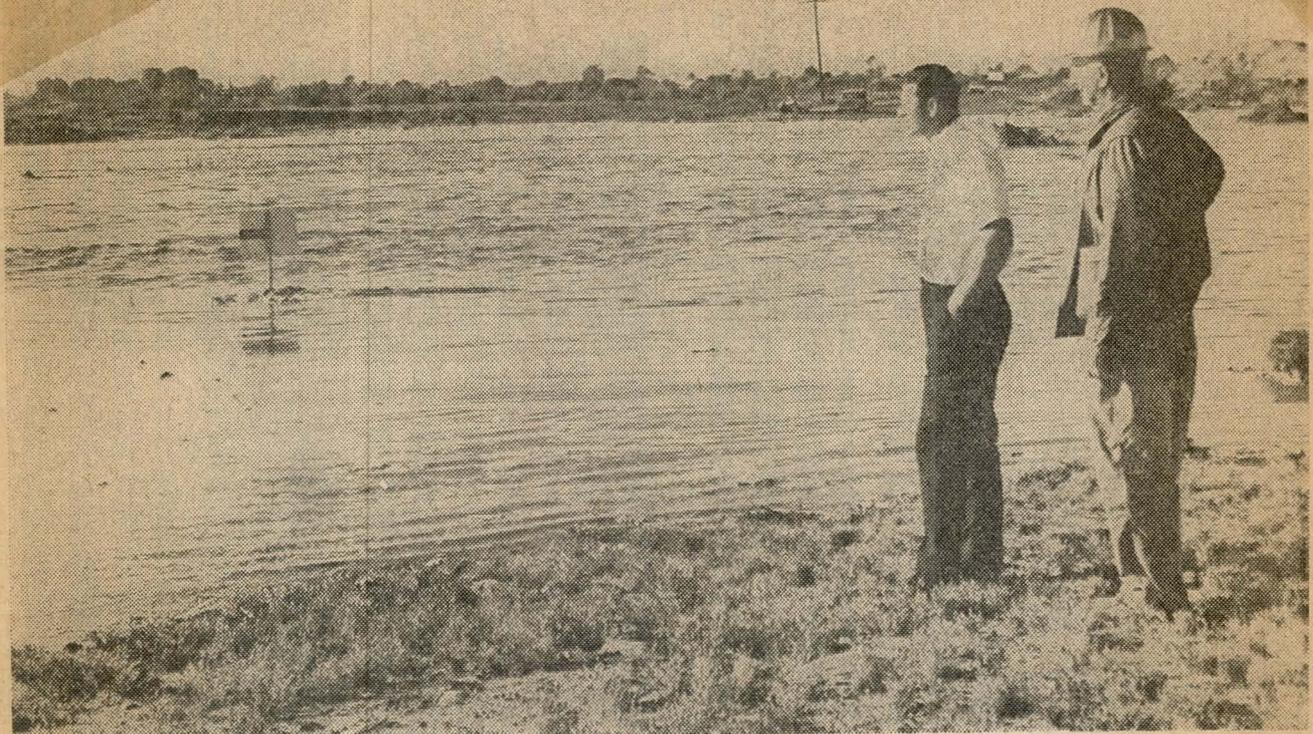
April 21, 1965



Ten-feet deep snow covers 12,600-foot-high Humphreys Peak, near Flagstaff, the highest spot in Arizona. Record

snow promises plentiful water for springs that feed Flagstaff water supply. Some water goes to Verde River drainage.

April 21, 1965



Water in the Salt River channel, coursing across Scottsdale Road with a depth of about four feet, is surveyed by Joe

Kush (left) of Tempe and Myron Neuffer of Bozeman, Mont. The road was among those closed to traffic.

REPORTER'S NOTEBOOK

High Waters Reveal River Facts

By KENNETH ARLINE
Gazette Staff Writer

They're learning a lot of new things about the old Salt River today.

For the first time since 1941, engineers and others interested in such things have found out exactly where the river's channel is below Granite Reef Dam.

THEY KNOW where water will go when it has a chance to run wild.

The usually dry river bed has changed a lot since its last good soaking 24 years ago. During that near-quarter-century the river bed has provided sand and gravel for

many of the Valley's homes, schools, churches, commercial buildings, sidewalks, roads and even swimming pools.

But water was pouring over the 29-foot high Granite Reef Dam 22 miles east of Phoenix today and the fact finders were busy with pencil and paper. They're learning how the physical changes have affected the river.

GRAVEL PITS, bed-level highway crossings, old auto bodies, vegetation and other obstructions made previous records obsolete.

The time required for 4,000 second feet of water to rush from Granite Reef (elevation 1,310 feet) down to Central

Avenue bridge (elevation 1,080 feet) wasn't the same in 1941 as in 1965.

Fact-finders include men from the Salt River Valley Water Users Association, the federal government, gravel firms, road builders and a lot of amateur statisticians.

PIONEERS SAW the river flooded in 1891. The 3,500 residents of Phoenix looked south from Washington Street into a "sea" of water. At Tempe, the railroad bridge collapsed and the town was "on the verge of submergence."

There were other floods in 1897, 1905, when an acre-foot of water covered the capitol grounds, 1916, 1920 and 1941.

Some sections of the river have flooded in recent years, but this was by water released from canals filled by heavy rains north of Phoenix.

THESE SMALL floods have halted traffic or trapped some careless motorists who thought they could get across. However, this water didn't give the river the test expected to result from the excess overflow from Granite Reef.

For many Valley residents, water flowing down the Salt will be a new experience. But it has happened before. And it will happen again—if for no other reason than to show our grandchildren that the Salt can be a river.

May 20, 1965

Runoff Report Issued By Project

Salt River Project officials have revealed that an evaluation of records kept during the heavy runoff of the Verde River showed that, while 252,000 acre-feet of water poured into the river's two reservoirs during the month of April, only about 21,000 acre-feet actually was spilled over Granite Reef Diversion Dam and flowed down the Salt River bed.

U.S. Weather Bureau officials have reported that, to date, 1965 has been the fourth wettest year since the turn of the century. From Jan. 1 to May 1, the total precipitation recorded at the Phoenix weather station has been 4.87 inches, which is nearly twice the average of 2.56 inches.

The exceptionally heavy rains and runoff from Project watershed areas began about the first of the year and continued through most of April.

Salt River Project General Manager R.J. McMullin reported that the total amount of water stored in the Verde reservoirs behind Horseshoe and Bartlett Dams jumped by about 282,000 acre-feet from Jan. 1 to May 1. The amount stored behind the dams on Jan. 1 was only 24,000 acre-feet, while the May 1 quantity was about 306,000 acre-feet.

(An acre-foot of water is equal to 325,850 gallons.)

The first real peak of the spring runoff, said Henry Shipley, Project associate general manager in charge of water, occurred April 4. This peak was caused mostly by rains, he said.

The second peak, which was caused by the melting of the snow-pack in the watershed areas, began about April 14. It reached its highest level on April 18 and then receded to a nearly normal level on April 23.

The average amount of water to flow into the Verde reservoirs during April is only 38,898 acre-feet, he said, adding that the April runoff this year was about 213,000 acre-feet above normal.

Bartlett Lake has a total capacity of 178,477 acre-feet. Horseshoe Lake's total capacity is 139,238 acre-feet, giving the Verde reservoirs a total capacity of 317,715 acre-feet.

On Jan. 1, Shipley said, the two reservoirs had only 19,243 acre-feet stored behind the dams. By April 1, the amount had risen to 172,393 acre-feet.

As water poured down the Verde River during April, Horseshoe Lake rose to its maximum operating capacity. When that occurred at 4 p.m., April 16, the spillway gates opened automatically to keep the water from running over the top of the dam.

By 2 p.m., April 19, Bartlett Lake had reached its maximum operating capacity and made it necessary to open the spillway gates there. It was the first time since 1941 that the gates were opened and the first time that Verde reservoirs had been full since the construction of Horseshoe Dam, which was completed in 1946.

The maximum operating capacity of the reservoirs is about 3,000 acre-feet below total capacity which provides a "buffer" in case of a storm, Shipley explained. "If the lakes were completely full," he added, "and a storm hit, it would cause a serious overflow at both dams and would mean that an uncontrolled amount of water would rush down the river like a flash flood. Therefore, when the reservoirs are nearly full, we allow a small space to take up any unexpected flow of water. It is a simple safety practice to protect the Valley."

Early on the morning of April 19, SRP officials notified Valley governmental officials, including highway departments and police agencies, that water from Bartlett's spillway gates would be flowing into the Salt River and that some of the water would have to be diverted over Granite Reef Dam into the normally dry river bed.

News media were also informed so that they might notify the public.

It was more than 27 hours after governmental officials were notified that the water finally reached the first major road, Country Club Drive in Mesa. Another six hours passed before the water reached Hayden Road between Tempe and Scottsdale.

Through the cooperation of news media, the public had more than 24 hours notice that traffic across the Salt River bed would probably have to be re-routed to crossings with bridges.

It was more than three days after the spillway gates were opened at Bartlett Dam before the water in the river bed reached its most westerly point in the metropolitan Phoenix area -- Seventh Avenue.

During the time that water flowed down the Salt River bed, only five major roads were closed along the 15-mile length of river channel from Country Club Drive to Seventh Avenue. Traffic at the bridge in Tempe was re-routed for two-way traffic as the lane which serves Phoenix-bound vehicles crosses the Salt River bottom and had to be closed.

By midnight April 22, only 58 hours after the gates were opened, the peak of the runoff on the Verde River had passed and the spillway gates at Bartlett Dam were closed. The gates at Granite Reef Diversion Dam were closed 18 hours later and no more water flowed into the river bed.

During the time that the spillway gates at Bartlett Dam had been open, 39,000 acre-feet had gone down the river. Nearly half of the amount -- more than 18,000 acre-

feet -- had been diverted into the Project's canal system, which was filled to its maximum operating capacity for delivery of water to lands and homes within the Project's water service area.

Although there was no way to predict the unseasonably high temperatures which had caused the rapid melting of the snow-pack in the Project's watershed areas, at the first sign of extremely rapid runoff, Project officials authorized the issuance of free water to any shareholder or municipality. That authorization became effective April 13 and remained in effect until April 25.

Since the water was free, many shareholders increased their orders and put the water to beneficial use for crop production. By drawing extra water from the reservoirs, more space was left to accommodate the inflow from the Verde River.

The value of the free water delivered for agricultural purposes, if it had been sold at regular rates, was about \$67,000.

The City of Phoenix received about 2,317 acre-feet (696,341,450 gallons) during the free water period. In the event the City uses its total of assessment water for 1965 and is required to purchase excess water, the free water received will be credited to the excess water purchases. If the free water were sold at the City's rate for a minimum charge to homes, the revenues received would be in excess of \$230,000.

Shipley also pointed out that since the City of Phoenix receives "credits" for any water stored behind the spillway gates at Horseshoe Dam, they now have credits totaling 77,000 acre-feet. This "gate water" can be sold by the City of Phoenix to areas outside the Project water service area.

(Areas outside the Project's water service area are basically those to the north of the Arizona Canal and south of the Highline Canal. This means that Deer Valley, Paradise Valley, and the South Mountain area outside Project boundaries will not be solely dependent on pumps but will have this "gate water" as an additional supply.)

"If the 77,000 acre-feet credit to the City of Phoenix were consumed at present usage," Shipley said, "the water would supply areas using 'gate water' about eight to ten years, and if it were sold at the City's rate for a minimum charge to homes, it would be worth, in revenues for the City of Phoenix, about \$8.3 million.

At no time during the heavy runoff was water let out of the Salt River reservoirs. All water coming into the Valley came from the Verde.

Shipley said that the water impounded behind Bartlett and Horseshoe Dams could not be released in smaller quantities over a longer period of time.

"The spillway gates at Horseshoe Dam were added to the dam by the City of Phoenix in 1949," he said. "Any water which is impounded behind the gates belongs to the City."

"When it appeared that the flow down the Verde River would be enough to necessitate the closing of the spillway gates to hold water for the City, Dario Travaini, director of the Phoenix Water and Sewer Department, sent the Project a letter ordering the closing of the gates.

"Under the Project's contract with the City, the gates can only be opened on orders of the City of Phoenix or by Project officials when the level is so high as to be above the maximum operating capacity of the two reservoirs and, therefore, unsafe," Shipley stated. "When the maximum operating capacity of the two reservoirs was reached, the gates were opened. In order to conserve water, the gates were closed at the earliest possible moment."

-5-23-65

Arizona
Republic

Computer Forecasts Future Of Groundwater Resources

Forecasts of a new electronic computer which was invented to predict future groundwater conditions in Central Arizona will "scare hell out of some people."

This statement is attributed to Horace H. Babcock, head of the U.S. Geological Survey's water resources division in Arizona.

Babcock was explaining the workings of the strange-looking device, which took scientists almost a year to develop in the USGS computer laboratory at Second Street and Roosevelt.

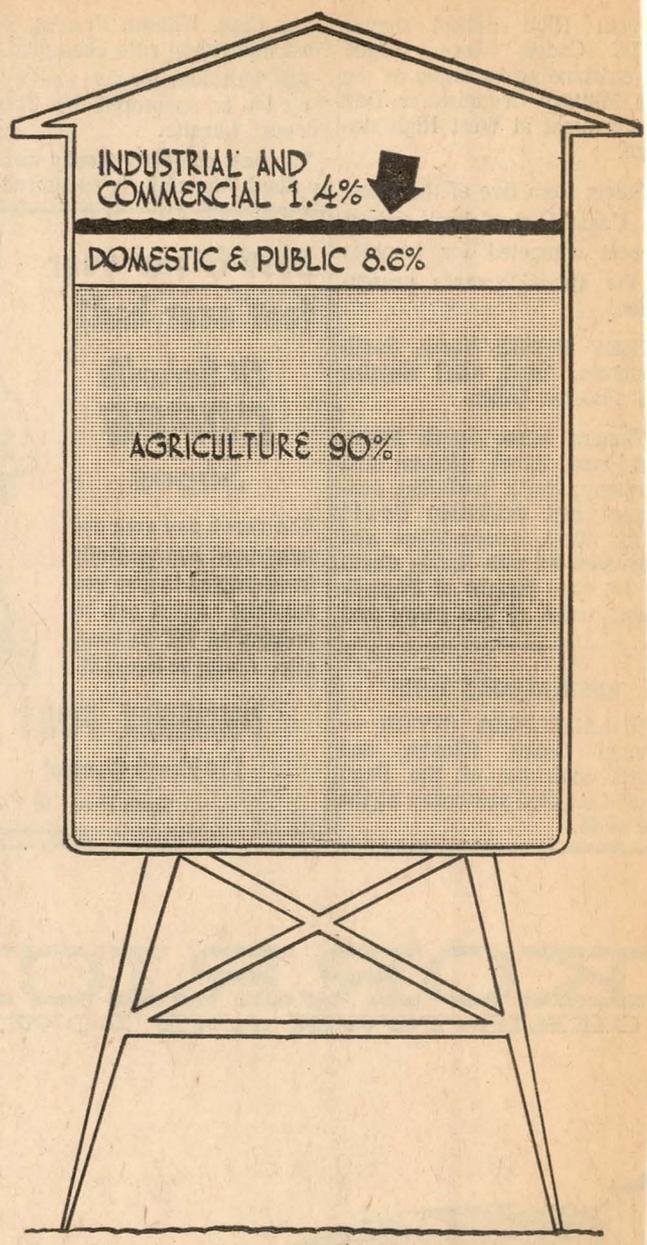
THE COMPUTER, given its first test run last week, resembles a large map gridded by thousands of interconnected wires, resistors and capacitors. Its brain is crammed with historical data and more precise water data collected by the USGS since 1939.

Babcock considers the computer a valuable psychological and technical tool for the Central Arizona Project. Its services, he said, will be offered to the U.S. Bureau of Reclamation.

PSYCHOLOGICALLY, he explained, predictions made by the computer should still some of CAP's detractors. Because the device can accurately predict groundwater trends in Maricopa and Pinal counties under any conceivable change, it will indicate where and how CAP water should be distributed for maximum benefit, Babcock said.

The USGS official said answers produced by the computer in fractions of a second would take scientists years to calculate. The answers appear in the form of hydrographs on the screen of an oscilloscope. These are photographed and later interpreted by technicians.

ONE OF THE first queries put to the computer during its initial operation last week was: "What effect will present pumping rates have on groundwater in the Mari-



WATER USE — Arizonans, according to government figures, used 7.34 million acre-feet of water for all purposes last year. Of this, 4.5 million acre-feet was groundwater and 2.84 million acre-feet surface water. As water tank graph indicates, agriculture continues to consume the bulk of the state's supply.

copa-Stanfield area 20 years from now?"

Depth-to-water already is about 400 feet in the area, some 300 feet below the level when intensive pumping began about 20 years ago.

THIS WAS the computer's answer:

—The water table around

Maricopa will decline an additional 100 feet.

—Water in most of the area between the two communities will subside 200 feet, and in the immediate vicinity of Stanfield, 300 feet.

—Just east of Stanfield is a section where a 400-foot drop is indicated.—A.J.S.

Lash Arizona Lowlands

Annual Deluge Hits In August

Arizona Currents
8-65

August is notorious in some areas of Arizona for its "un-august" conduct. It is flood season.

The drama of damage unfolds this way:

The desert lays parched under the burning August sun. Then the rains come.

Angry rapids run in usually dry washes, crops are drowned, highway crossings submerged, lives are lost.

Too-full sewer systems belch back water, creating miniature lakes in the midst of cities and towns.

FLOOD HISTORY

Arizona's history testifies that the above drama is a recurrent one in many of the state's valley areas. Extensive destruction has frequently followed in the wake of August rains partially because citizens have refused to heed warnings of an established flood pattern.

The great flood of 1891 washed out the railroad bridge across the Salt River at Tempe and left the Phoenix area without rail connection to the outside world for approximately three months. The Salt was eight miles wide where the Verde River joined it.

Glendale citizens recall floating on log rafts in the streets dur-

ing a 1921 torrent. Another bad flood hit in 1943 when water swept over Cave Creek Dam and covered much of what is now residential Northwest Phoenix.

What in years past was desert area and farm land now comprises a vast district of new homes and businesses. Thus, flooding is more costly to the state than ever before.

DANGERS IGNORED

L.E. Ohsiek, an engineer with the Maricopa County Flood Control District, reports, "Increases in population have sometimes led to development on the flood plains of washes and rivers without due regard to the presence of flood hazard."

"Flood insurance is practically non-existent and people are now becoming more aware of the problem. Our office has at least 10 inquiries per week from real estate people regarding possible flooding," he adds. There is now a policy in effect whereby anyone in Maricopa County planning to build in a potential flood area is alerted to this fact.

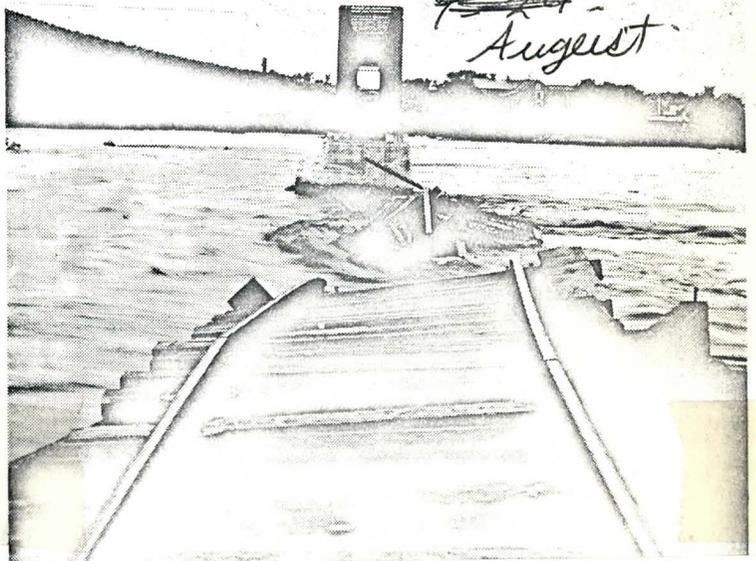
In recent years the July and August rains have taken their toll in damage to desertlands.

Last year Tucson claimed \$10 million in water damages; Yuma asked for flood funds; Pima County farmers were badly hit;

(Continued on Page 2)

Water information

Ariz Currents
~~7-65~~
August



STATE-ment

from th

BORIS GOES NATIONWIDE: W
recently when a reader infor



GREAT FLOOD of 1891 washed out railroad bridge across the Salt River at Tempe, isolating the Phoenix area for months. (Additional flood picture on woman's pages.)

species of oak, juniper and man-
zanita appear. The Mexican blue-
oak and the Emory oak are prom-
inent. Chihuahu and Arizona pine
are also prominent.

Floods Lash Arizona

(Continued from Page 1)

Tombstone was ravaged by flash floods; Pinal-Santa Cruz Counties claimed \$2.5 million in flood damages. Property damage in Northwest Phoenix and Glendale area amounted to \$2,900,000. This is only a portion of the flood damage in Arizona last year.

CONTROL PROJECTS

In view of this situation, Maricopa County has given immediate consideration to projects which call for flood channels and dams on the perimeter of the Phoenix-Scottsdale area. Attention is being focused on hazardous areas such as Indian Bend Wash, Cave Creek, Skunk Creek, New River, Agua Fria River, the Arizona Canal, and Glendale-Maryvale area.

Two projects in the compre-

hensive countywide flood control program (approved by the board of supervisors in 1963) have passed public works committees in the U.S. Senate and House of Representatives. Both are expected to be included in the omnibus flood control bill scheduled to go before Congress later this year.

It calls for a \$9 million channel along Indian Bend Wash to protect Scottsdale and Tempe and a \$70 million project for the greater Phoenix area. A \$22.7 million bond election will be necessary to finance the county's share of this program. The federal government's share is more than \$90 million.

The county would finance acquisition of rights-of-way, relocation of utilities and maintenance as the program is completed. (See page 7 for a related story on flood damage.)

Arizona Currents
August, 1965

Application to
mail at second
class postage
rate is pending
at Phoenix,
Arizona.

Floods Lash Arizona Lowlands

Annual Deluge Hits In August

Floods Lash Arizona

(Continued from Page 1)

Tombstone was ravaged by flash floods; Pinal-Santa Cruz Counties claimed \$2.5 million in flood damages. Property damage in Northwest Phoenix and Glendale area amounted to \$2,900,000. This is only a portion of the flood damage in Arizona last year.

CONTROL PROJECTS

In view of this situation, Maricopa County has given immediate consideration to projects which call for flood channels and dams on the perimeter of the Phoenix-Scottsdale area. Attention is being focused on hazardous areas such as Indian Bend Wash, Cave Creek, Skunk Creek, New River, Agua Fria River, the Arizona Canal, and Glendale-Maryvale area.

Two projects in the compre-

hensive countywide flood program (approved by the of supervisors in 1963) passed public works committee in the U.S. Senate and House of Representatives. Both expected to be included in the omnibus flood control bill scheduled to go before Congress later this year.

It calls for a \$9 million channel along Indian Bend Wash to protect Scottsdale and Tempe. A \$70 million project for the greater Phoenix area. A \$10 million bond election is necessary to finance the county share of this program. The federal government's share is more than \$90 million.

The county would finance acquisition of rights-of-way, relocation of utilities and maintenance as the program is completed. (See page 7 for a story on flood damage.)

August is notorious in some areas of Arizona for its "un-august" conduct. It is flood season.

The drama of damage unfolds this way:

The desert lays parched under the burning August sun. Then the rains come.

Angry rapids run in usually dry washes, crops are drowned, highway crossings submerged, lives are lost.

Too-full sewer systems belch back water, creating miniature lakes in the midst of cities and towns.

FLOOD HISTORY

Arizona's history testifies that the above drama is a recurrent one in many of the state's valley areas. Extensive destruction has frequently followed in the wake of August rains partially because citizens have refused to heed warnings of an established flood pattern.

The great flood of 1891 washed out the railroad bridge across the Salt River at Tempe and left the Phoenix area without rail connection to the outside world for approximately three months. The Salt was eight miles wide where the Verde River joined it.

Glendale citizens recall floating on log rafts in the streets dur-

ing a 1921 torrent. Another bad flood hit in 1943 when water swept over Cave Creek Dam and covered much of what is now residential Northwest Phoenix.

What in years past was desert area and farm land now comprises a vast district of new homes and businesses. Thus, flooding is more costly to the state than ever before.

DANGERS IGNORED

L.E. Ohsiek, an engineer with the Maricopa County Flood Control District, reports, "Increases in population have sometimes led to development on the flood plains of washes and rivers without due regard to the presence of flood hazard."

"Flood insurance is practically non-existent and people are now becoming more aware of the problem. Our office has at least 10 inquiries per week from real estate people regarding possible flooding," he adds. There is now a policy in effect whereby anyone in Maricopa County planning to build in a potential flood area is alerted to this fact.

In recent years the July and August rains have taken their toll in damage to desertlands.

Last year Tucson claimed \$10 million in water damages; Yuma asked for flood funds; Pima County farmers were badly hit;

(Continued on Page 2)



GREAT FLOOD of 1891 washed out railroad bridge across the Salt River at Tempe, isolating the Phoenix area for months. (Additional flood picture on woman's pages.)

Ariz. Republic
1-16-66

Guy Stillman Heads Flood Committee

Guy Stillman yesterday was appointed secretary of the Maricopa Citizens Flood Protection Committee.

Stillman, a Scottsdale engineer and businessman who lives at 7303 N. Scottsdale Road, has lived in the Valley since World War II.

The committee, with headquarters at 2933 N. Central, is seeking to coordinate voter support for the \$115 million flood control program to be voted on in a special county election March 8.

W. B. BARKLEY, committee chairman who announced Stillman's appointment, said "the electorate will be asked only to approve issuance of \$22.7 million in bonds by the county.

"This action in turn will make available here some \$93 million in federal construction funds during the next decade," Barkley said.

He explained county funds from the bond sale would be used to acquire necessary rights of way, modify certain existing roads and bridges, and to maintain a complex of flood control structures to be erected by the U.S. Army Corps of Engineers and the Soil Conservation Service.

12-17-65

Snow Covers All Arizona Northlands

Snow covered Northern Arizona from border to border this afternoon to the delight of ski enthusiasts and to the despair of Christmas tree hunters.

The snow, along with rain, was expected to add still more thousands of acre feet of water in Salt River Project reservoirs. It was also putting the damper on highway travel.

HEAVIEST SNOW today, 34 inches, was at Maverick in the White Mountains. Other measurements showed 27 inches on Mingus Mountain near Jerome; 20 at Pine, 19 at Tonto Fish Hatchery, 17 at McNary, 16 at Payson, 12 at Williams and

★ ★

New Mexico Highlands Snow-Laden

By The Associated Press
Wintry weather deposited as much as six more inches of snow in the high country of New Mexico today.

Light snows persisted all along the Great Lakes, from Duluth to Ottawa and on into Northern New England. New accumulations in this section, however, generally were considerably less than one inch.

LIGHT RAINS dampened the Southeastern Seaboard from Texas to the Carolinas.

The sun broke through the disintegrating clouds, however, to warm the newly whitened

Flagstaff, 8 in Jerome, 6 at Grand Canyon, 3½ in Springerville, 3 at Snowflake and St. Johns, and 1 at Winslow and on the Painted Desert.

"All ski areas have an abundance of snow, with only one problem—how to clear the roads so the customers can get there," the Weather Bureau reported.

Roads to the ski areas are expected to be opened before the snow melts and skiers were asked to be patient.

CHRISTMAS TREE hunters were out of luck. The last area open for tree cutting was closed this morning. A forest ranger at Camp Verde said snow and impassable roads forced the closing.

The weatherman said partial clearing is expected in parts of Arizona, including the Valley, tonight. In some parts of the state the snow level will drop to 4,000 feet elevation.

The clear skies will mean low early-morning temperatures. A low of 37 degrees is expected tomorrow at Sky Harbor, where the temperature dropped to 45

● STORM

Concluded From Page One

Great Plains and Northern Rockies. Some areas needed warming. The temperature fell to 16 below zero at Butte, Mont.; 11 below at Ely, Nev., and 9 below at Fargo, N. D. this morning.

THE SIX-INCH fall of snow was recorded at Grants, N. M. in six hours, and Zuni, near the Arizona border measured three inches.

Southern California caught a spate of showers yesterday, and the Mojave Desert was blanketed by a two-inch snowfall, with additional accumulations expected. Lightning struck a transformer in Fontana, Calif., knocking out power to 1,500 homes.

In Nevada, yesterday, a mixture of fog and snow contributed to the collision of a station wagon school bus and another car which killed a driver and injured a 15-year-old schoolgirl critically near Eureka, Nev., on U.S. 50.

Turn to ●STORM on Page 8

Turn to ●SNOW on Page 8

State Gets New Rain, Snow

12-17-65 Arizona Republic

Highway Conditions Hazardous

HEAVY snowfall was expected last night over a large part of Arizona, from north of Williams to the south slopes of the Mogollon Rim.

The U.S. Weather Bureau at Sky Harbor Airport said accumulations of 4 inches or more with up to a foot were possible. No immediate break in the weather pattern of the past 10 days was anticipated.

It was forecast the state will have below normal temperatures and higher than usual pre-

See Weather Box on Page 27

cipitation for five days. After a morning respite yesterday, rain and snow were again falling by midday over much of Arizona.

Driving conditions in the snow areas continued hazardous, with chains recommended. In rain areas, the Arizona Highway Patrol cautioned motorists to be alert for slick spots and for water and debris on the highways.

All roads and streets were open last night in Maricopa County.

Meantime, Phoenix had received .17 of an inch of rain last night, pushing the year's total to 10.11 inches. This is the first year since 1952, when 10.65 inches were recorded, that Phoenix has had more than 10 inches of rain in a calendar year.

THE WEATHER Bureau reminded residents that December is one of the Valley's wettest months outside the thunderstorm season.

"If it is any consolation to Arizonans and their visitors," the weatherman added, "precipitation of one sort or another has occurred in all 50 states today."

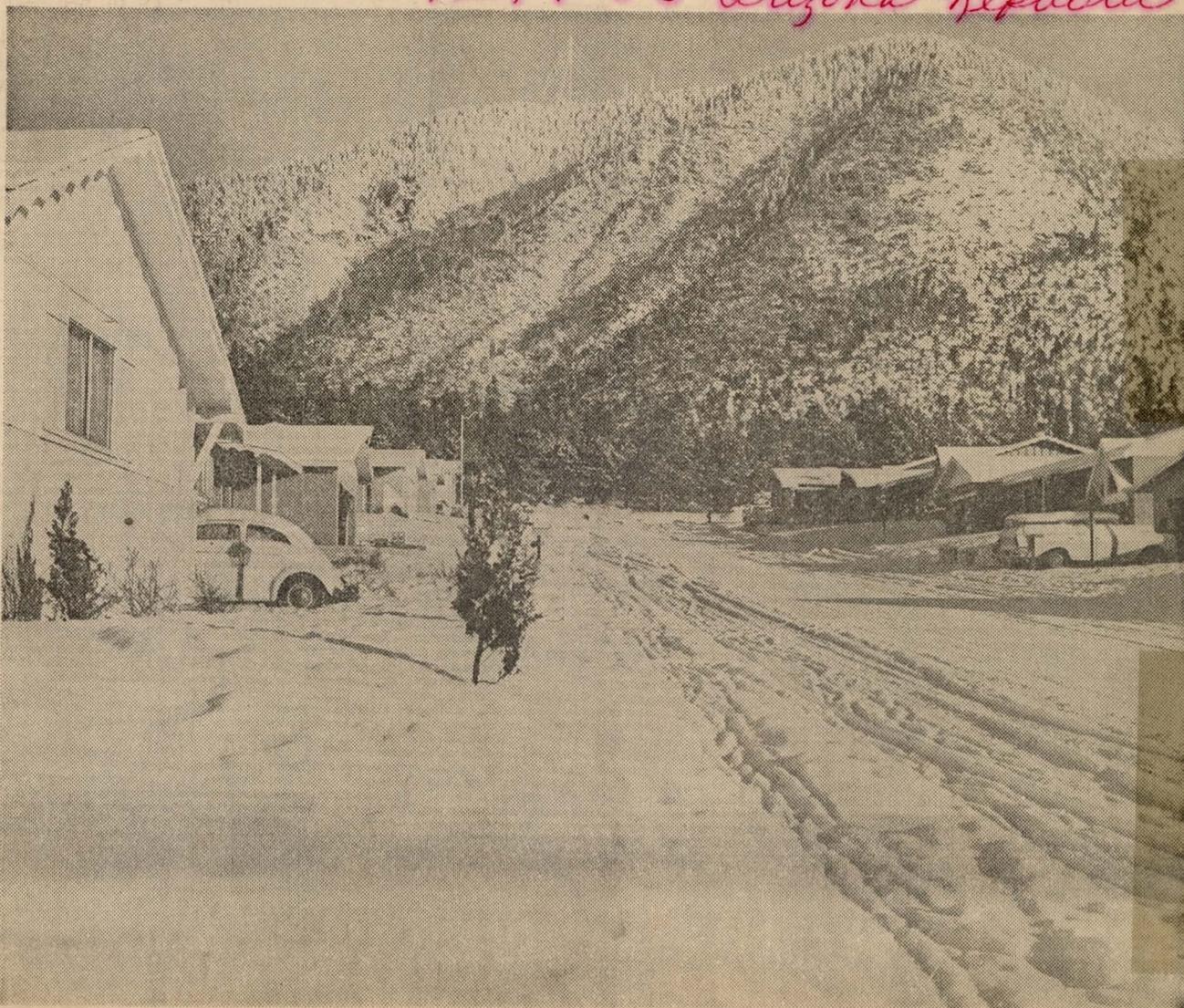
The low temperature in Phoenix was 35 degrees yesterday, with a minimum of 40 forecast today. South Mesa reported 32 degrees for the lowest temperature in the Valley.

The high here yesterday was 52, and it will be about the same today.

The Weather Bureau was expecting partial clearing and an end to the snowfall in the western area of the north half of the state by early today, with some clearing in the east by tonight. Considerable fog was forecast to follow. Only a few snow flurries in the mountains are expected tomorrow.

In the southern half of the state, snow was expected to fall above the 5,000-foot level with heavy snow in eastern mountains. Gradual clearing was

(Continued on Page 14, Col. 1)

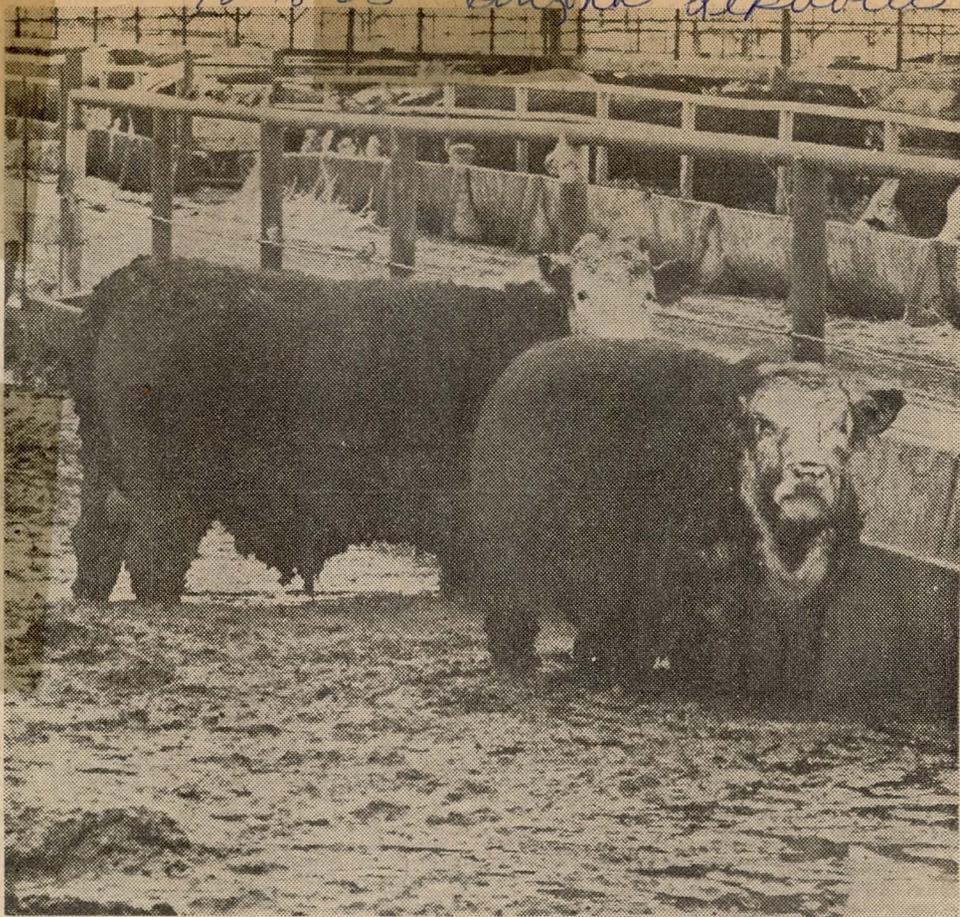


SNOW SCENE—Snow-covered Mt. Elden at Flagstaff serves as backdrop to an east Flagstaff

neighborhood covered with a foot of snow. New snow was expected overnight.

Republic Photo by Bill Nixon

12-18-65 Arizona Republic



Republic Photo by Harrison Brown

MUD IN YOUR EYE—Two Hereford steers are hardly impressed with outdoor living in Phoenix. Up to their knees in mud, the pair could see nothing merry about Christmas after rain made muck of their hoofing grounds. (Other pictures on Page 16)

Guess What's Due Tomorrow? R - - -

ONE BIG winter storm moved out yesterday, and another was predicted for tomorrow, while snow continued to fall in northern Arizona and rain spattered other parts of the state.

The weather outlook for today calls for showers in southeastern Arizona with snow in the mountains and partial clearing in the north.

But another vigorous storm system is moving slowly through the Pacific Ocean toward the California coast and will spread more cloudiness into the Southwest by tomorrow, the Weather Bureau said.

THE FIVE-DAY forecast indicates considerable rain and snow in Arizona from this storm by tomorrow or Monday, according to the Weather Bureau.

It is expected to be sunny in Phoenix this afternoon, but increasing cloudiness is predicted tomorrow. Phoenix had rain yesterday for the ninth of the last 10 days.

Yesterday's snowstorm added to the already deep cover in the Flagstaff area, where 16 inches were on the ground by midday. The Arizona Highway Patrol continued to advise motorists to use tire chains in

the northland, and not to travel unless absolutely necessary.

THE FLAGSTAFF Weather Bureau said precipitation totaling 33.22 inches so far in 1965 was creeping up on the 1905 record. That year 34.53 inches were recorded.

Snow depths around Arizona include 24 inches on the ground at Pine in the White Mountains, 17 inches at Payson, 10 at Show Low and 8 at Grand Canyon.

It was reported that 8 foot snowdrifts have closed the trail to the top of Signal Peak in the Pinal Mountains southwest of Globe. The microwave relay tower at Signal Peak, which serves the Pinal County sheriff's radio and the central Arizona Highway Patrol district, went out yesterday morning and the emergency unit failed to come on completely.

ATTEMPTS to cut through the drifts yesterday afternoon with a caterpillar - bulldozer were unsuccessful when the vehicle stalled. However, the Pinal County sheriff's office reported its car-to-car radios still were working.

Bisbee reported .75 inch of snow mixed with rain in the 24-hour period that ended at 5 p.m. yesterday. A steady snowfall from 8 a.m. to noon left the nearby Mule Mountains covered with more than 2 feet of snow. Temperatures were in the low 30s.

Among the heavier precipita-
(Continued on Page 16, Col. 4)



MODERN DAY FERRY — True, in olden days, Tempe was known as Hayden's Ferry. True, Wednesday morning the southwest section of the city could have used a ferry here and there. At the intersection of Hardy drive and 19th street, David Cox, 1715 Hardy,

and Ronnie Moore, 821 West 18th street, went boat riding. Rainfall of .69 inch plus some bad drainage "promoted" the "lake." Numerous residents registered complaints.

Bill Dooley photo

New Storm Belts Area Wednesday

Local Measurement Totaled .69 Of An Inch, Figures Varied Widely At Other Checkpoints

Along about 11:30 this morning the sun shone in Tempe.

But not for long as dark clouds again returned and more rain fell shortly after the noon hour. And more is expected.

Meanwhile, the December rainfall totals at four observation stations in and around Tempe continued to climb sharply upward following a night and early morning storm that lasted around eight hours.

Rain began falling around 11:20 last night and continued until around 7 this morning when it finally stopped.

And when this particular phase of rainfall had finished falling, the December overall precipitation totals were jumped anywhere from just over one-half inch to nearly a full inch at the four major checkpoints nearby.

In the heart of Tempe at the O. L. Barnes home, 1104 Ash avenue and site of a volunteer weather observation station, the reading at 8 a.m. this morning following last night's rain came to .69 of an inch.

According to Barnes' figures this pushed the overall December precipitation total to 3.64 inches while for the past five weeks and including the Thanksgiving week storm, a total of 4.60 inches has been recorded here.

Also reporting .69 of an inch was the University of Arizona's Citrus Station, directly south of Tempe. Measurements at this checkpoint total 3.98 for the month and 5.25 for the past five weeks.

Heaviest reading for last night's rain was noted at the UA Experimental Farm east of town on the Tempe-Mesa highway where .93 of an inch was recorded, while the lowest total was .54 chalked up at Sky Har-

bor airport, home of the U. S. Chamber of Commerce weather bureau.

At the UA Farm the December and five weeks totals are 3.46 and 4.41 respectively while at the airport they are 2.70 and 3.51.

In commenting on this and the other storms so far this month, the weatherman noted that these storms have been more like summertime activity with the intensity of rainfall varying widely from area to area.

Rain, Snow Sweep State; Heavy Runoff Predicted

Phx Gazette 12-22-65

Reservoir Overflow Possible

By C. M. McMILLEN
Gazette Staff Writer

Better than average snow cover in Arizona's northern and eastern mountains gave promise today of heavy spring runoff into the reservoirs that supply the Valley of the Sun.

Observers foresaw the possibility of the reservoir's overflowing.

In the Mount Baldy area, highest of the peaks in the White Mountains in Eastern Arizona, snow measurements made this week at the 11,000 foot level showed up to 75 inches of snow.

WATER CONTENT for spring runoff is heaviest so far near Hannagan Meadows along Coronado Trail, around 45 miles south of Springerville. On this snow course there is 7½ inches of water content to flow down the streams to both Salt and Gila river reservoirs, since this is near the divide. Snow depth is 37 inches.

The U.S. Soil Conservation Service, White Mountain Apaches, national forest officials and Salt River project joined in making these earlier than usual snow measurements and runoff prospects available. Usually the first official snow course measurements and reports come shortly after mid-January, but the early season heavy rains and snows brought this preliminary report today. Dick Enz, snow survey supervisor, evaluated the early reports.

ON MOGOLLON Rim, 10 miles north of Pine and above Strawberry on Becker Butte there is 26 inches of settled snow with 5 inches of moisture. Snow moisture was best east of Mount Ord, but it ranged from 4 inches in the Nutrioso area, with 17 inches of snow to 6 inches in the Hawley Lake area at around 8,300 feet elevation. The best water content, 7½ inches in the Mount Ord-Baldy area was measured at around 11,000 feet.

Along the Payson-Holbrook road there is 16 inches of settled snow with 3 inches of water content. Snow depth had been better than fence-top deep in several White Mountain areas.

White River is flowing a good stream. Good snows have fallen on the Big Cienega and Greens Peak areas, east of McNary.

WHILE reservoirs were gaining slowly today from earlier rains, a new surge is expected tomorrow from moderate to heavy night rains that began around Verde and Salt river lakes around midnight.

.54-Inch Moisture Falls In Phoenix

Rain and snow beat down on Arizona today as the third big storm of the month moved across the state.

Three inches of snow was reported at Flagstaff where the annual precipitation record of 34.53 inches, set in 1905, was about to be eclipsed. Early morning precipitation in the Northern Arizona city brought the December total to 3.72 inches and the 1965 figure to 33.57 inches, less than an inch shy of the all-time record.

Rainfall at Phoenix Sky Harbor measured .54 inch early today and brought the December total to 2.70 inches, the third highest on record.

★ ★ ★ ★

Telephone Service Disrupted

Telephone service to at least five Valley communities was disrupted late this morning by "water-soaked cables" near Mesa, a telephone company official said.

The official said rain flooded a manhole and apparently seeped into the cables.

COMMUNITIES affected include Mesa, Higley, Apache Junction, Chandler and Globe.

"Residents in those areas can call each other, but they can't call out of town," he said.

The spokesman said service would be out for "about four hours."

MEANWHILE, mobile telephone units were dispatched to hospitals in Mesa and Chandler and to "other strategic locations" in the affected area and police departments were being notified where the emergency units are located.

The flooded manhole is between Mesa and Tempe at MacArthur and the Apache Trail. Crews were on the scene.

"It's a main trunking cable," the spokesman said.

The Pacific-born storm moved into the state last night—about the time winter arrived at 6:41 o'clock. Before morning, most of Arizona had received generous precipitation.

Totals reported included .35 at Yuma, .21 at Tucson, .24 at Prescott, .32 at Douglas and .10 at Grand Canyon. The latter, in form of new snow measuring 2 inches, brought the snow depth to 6 inches.

Today was the ninth day this month with .01 or more of rain at Sky Harbor. The record, 10 days, was set in 1914 and equaled in 1923 and 1926. Normally the month has four such days.

WILLARD Groene, the Weather Bureau's volunteer observer near Mummy Mountain in Paradise Valley, reported his station's total for 1965 is now a record 14.95 inches. Groene has been watching the rainfall at the location since 1955. The previous high, 10.07, fell in 1959.

Rainfall at the Phoenix post office since Jan. 1 has reached 13.01. That's highest since 17.26 inches in 1941 and the fifth highest for downtown Phoenix in any year since 1896. The record, 19.73 inches, fell in 1905.

IN THE Tucson, area, where heavy rains are bringing the total for the year up to normal, sheriff's deputies were called to rescue two girls trapped in a car by flood water.

Deputies, who went to a location six miles southwest of Redington, said the girls were wet but in no apparent danger. The girls had been accompanied by a youth who left them to summon help.

THE STORM generally extended from border to border and Nogales, on the U.S.-Mexico border reported .82 of rain during the night. This brought the month's total to nearly 7 inches.

Flooding forced closing of the Maricopa Road crossing on the Gila River. Highway patrol headquarters recommended chains for cars in the snow areas.

Flood Threat Along Gila

12-23-65 Arizona Republic

Graham, Greenlee Warned

By EARL ZARBIN

FLOOD warnings were issued last night for parts of the upper Gila Valley in southeastern Arizona as the result of heavy rains and melting snow in mountains along the Arizona - New Mexico border.

Late last night a car was spotted in the Agua Fria River at the Van Buren crossing, the water lapping at the roof and a light on inside.

Avondale police didn't know what happened to the occupants.

Related Weather Stories On Pages 9 and 15.

The river was 200 yards wide at the crossing.

The U.S. Weather Bureau in Phoenix said low-lying sections of the Gila Valley in Graham and Greenlee counties will be in danger of flooding through today.

The Weather Bureau had a report that the Gila River at Cliff, N.M., 25 miles east of the Arizona border, was 2 feet over flood stage, and the San Francisco River running through Clifton was almost at flood stage.

The crest of high water should reach Safford tonight, the bureau said.

The Graham County sheriff's office said last night, "There's no crisis here. No special precautions are being taken."

The river lies a mile north of Safford.

In Clifton, however, the Arizona Highway Patrol reported said bagging was in progress in some areas. Telephone circuits between Clifton and Safford were out.

The Gila and San Francisco rivers join 6 miles southwest of Clifton. The Gila empties into San Carlos Lake behind Coolidge Dam, which has a storage capacity of 1.2 million acre-feet.

The San Carlos River overflowed its banks north of San Carlos Lake for a 10-mile stretch from Peridot at U.S. 60-70 to 7-Mile Wash north of San Carlos.

Ten families living in low-lying areas along the river were evacuated from homes, according to Mike Windham, chief criminal investigator for the Bureau of Indian Affairs at the San Carlos Indian Agency. He said the water in some homes was 3 to 4 feet deep.

Floodwaters also crept into homes in the vicinity of 47th Avenue and Crittenden Lane in Phoenix when storm drains overflowed. About 100 homeowners complained to city authorities.

In addition, Central at the Arizona Canal was closed for 1½ hours when the canal overflowed. Water in the Phoenix

(Continued on Page 9, Col. 2)



LAKE ASU — Rains from the storm which drenched the state yesterday left the parking lot next to the tennis courts at Arizona State Univer-

sity looking like a small lake. The new rain to the headaches of road repair crews who filled all the chuckholes caused by rains.

More About

Watershed

(Continued from Page 1)

safety valve for handling water dumped from the dams.

THE VALLEY'S canal system was full of local rain runoff, making it impossible to use the canals to divert water from the Salt River around Phoenix and back into the river below the city.

Project officials were uncertain about the possibility of having to dump water from Saguaro Lake on a larger scale last night.

The lakes' operating capacity is below actual capacity, officials said, creating a buffer that possibly will help avoid major water release unless the storm continues longer than anticipated.

Reservoirs Brimming Over

Too Much Water Below Roosevelt Dam Creates Flood Problem for Valley From Lower Lakes

A RESERVOIR storage problem yesterday cast a shadow on the Salt River Valley's best water prospects in 25 years.

Salt River Project officials began releasing water into the Salt River system from Stewart Mountain Dam at Saguaro Lake late yesterday.

The spillage is expected to reach 48th Street at 9 a.m. today. It will be swelled by runoff into the river from below the reservoirs.

LAST NIGHT, water was flowing over Granite Reef Diversion Dam below the reservoirs at the rate of approximately 2,000 cubic feet per second. The dam regulates water flow into the canal system.

A U. S. Soil Conservation Service water expert said yesterday that November and December precipitation at higher elevations has got watershed storage off to a "good start" for spring runoff.

Richard L. Enz, snow survey supervisor, was optimistic that snow cover in the mountains above 8,500 feet will produce the best water storage since 1941, the last time Salt River reservoirs overflowed.

ENZ SAID rain on top of snow in intermediate elevations yesterday was producing an immediate runoff more rapidly

than warm temperatures would have produced by direct melting.

The three lower lakes of the Salt River storage chain—Apache, Saguaro and Canyon—were reported at full operating capacity last night, with the fourth

lake, Roosevelt, able to take about 400,000 acre-feet more.

Heavy rain in the Phoenix area eliminated one possible (Continued on Page 9, Col. 3)

Reservoir Overflow Possible

PHX.
Gazette
12-23-65

Runoff into Roosevelt Lake from the Salt River today reached the highest peak since records were started in 1913—enough to pour an estimated 100,000 acre-feet of water into the lake in 24 hours.

The U.S. Geological Survey, which measures water flow in the Salt and Verde watersheds, said that if the runoff on the Salt River continues at near its record pace, it would fill all four Salt River Project reservoirs to overflowing within three to four days.

ADDITIONAL showers are forecast in the Valley through today, but the Weather Bureau said skies should start clearing tonight, becoming mostly sunny tomorrow.

Rod J. McMullin, Salt River Project general manager, said water may go over Roosevelt Dam spillways in the next two days for the first time since 1941.

If this happens, he said, it may be necessary to open the spillway gates on the entire four-dam Salt River system.

Flooding was reported along the Gila River at Safford and Sacaton, south of Chandler. Washes and low-lying areas in Tucson also flooded, as did crossings along the Salt River east and south of Phoenix and the Agua Fria and New rivers northwest of Phoenix. Flooding also was reported in westside areas.

Swirling water in the Gila River broke a dike and overflowed the entrance of Estrella Mountain Park off U.S. 80 near Goodyear. No homes were in the flood path.

"IT WAS about 15 feet deep and we closed the roads in the area," a County Highway Department spokesman said.

On the Salt River at Roosevelt Lake, the runoff peak was reported at 150,000 cubic feet per second, compared to previous high of 117,000 cubic feet in 1941. (At a rate of 150,000 cubic feet per second, if maintained for 24 hours, runoff would measure 300,000 acre-feet. However, the Geological Survey said the peak would not last for the 24-hour period.)

A dike also broke on the Santa Cruz rim, threatening farm homes south of Stanfield.

On the Verde River, the runoff peak also is approaching the 100,000 cubic feet per second record set in March 1938.

McMULLIN SAID that if current runoff trends continue there is every likelihood that spillway gates at Sahuaro Lake, which is taking some of the excess from Mormon Flat Dam upstream, will have to be opened before 8 p.m. today. At 8 a. m. today, there was 64,000

Turn to ●PEAK on Page 4

○ The Phoenix Gazette

● PEAK RUNOFF

Concluded From Page One
acre-feet of water in Sahuaro Lake. The lake has a capacity of 69,765 acre feet.

Rains since Dec. 9 have already filled the lower lakes of the Salt River's storage chain to near peak operating capacity. If it is necessary to spill Roosevelt Lake, excess water will have to be dumped down the chain to Granite Reef diversion dam. At this point, it will be let into the Salt River bed.

Some water, primarily runoff on the desert below Sahuaro and Bartlett lakes, already is flowing down the riverbed.

THE PROJECT began releasing water from Mormon Flat Dam at Canyon Lake several days ago in order to maintain some control over the heavy runoff. This water was let into Sahuaro Lake.

Early yesterday, Sahuaro Lake reached its peak operating capacity and valves at the base were opened permitting water to flow down the river to Granite Reef diversion dam.

Hopes of maintaining complete control of storage water were dashed by the sudden runoff from streams feeding Roosevelt, sending thousands of gallons of water into the reservoir.

AT 8 A.M. today Roosevelt Dam impounded 1,170,259 acre feet of water. Its capacity is 1,381,580. Project spokesmen said that, if the current runoff

trend continues, Roosevelt will receive about 280,000 acre feet of water within the next 36-48 hours. At this point it will be necessary to open the spillway gates.

The stair-stepping water flow would first reach Apache Lake at Horse Mesa Dam. Apache is already nearly full. Contents early today totaled 244,663 acre feet. Its capacity is 245,138 acre feet.

Next step down the storage ladder would be Canyon Lake at Mormon Flat Dam, which is already spilling water into Sahuaro Lake. Contents of Canyon Lake early today were 57,044 acre feet. Its capacity is 57,857 acre feet, but an outflow must be maintained to compensate for runoff going directly into Canyon Lake.

THE VERDE RIVER system, composed of Horseshoe and Bartlett dams, is also experiencing an unexpected runoff inflow.

Horseshoe Lake, the upstream reservoir, contains about 102,253 acre feet. Its capacity is 139,238 acre feet. However, considerable water can be dumped from Horseshoe downriver into Bartlett Lake, which can take about 50,000 acre feet. Early today, Bartlett contained 123,699 acre feet. It has a total capacity of 178,477.

Meanwhile, Valley traffic was swamped in high water today.

More than three-fourths of an inch of rain was recorded at the airport weather station in the 24 hours up to 5 a.m. today and higher readings were reported elsewhere in the Valley.

MORNING rush-hour traffic bogged down at such points as the Tempe Bridge, while many other crossings on the Salt, Agua Fria and New rivers were closed by water.

Even at the Country Club Drive crossing north of Mesa, where a series of giant culverts were installed recently, pavement was awash.

MORE SNOW fell in Northern Arizona last night, and Flagstaff had eight inches of new snow yesterday. The storm set a new precipitation record for Flagstaff, breaking the old mark of 34.53 inches, recorded during 1905. At midnight, the year's total at Flagstaff was 34.83 inches.

At the Tempe crossing of the Salt River, the riverbed traffic lane carrying northbound traffic was flooded and two-way traffic was being carried by the bridge, which normally carries only southbound cars.

As a result, rush-hour motorists were able to move at only 5 to 10 mph, and traffic was backed up, bumper-to-bumper, for about three-fourths of a mile.

In addition to Country Club Drive, other Salt River crossings closed were at 40th and 48th streets, Scottsdale and Hayden roads.

Thomas and Indian School roads were closed at the Agua Fria River. Glendale and Northern avenues were flooded at the Agua Fria and New River crossings, although some cars were reported getting through on Glendale.

Traffic to Luke Air Force Base was routed west on U.S. 80 and north on Litchfield Road.

Phoenix police reported 153 traffic accidents during a 24-hour period ending at 6 a.m. today, more than twice the usual number. Rain - slick streets were blamed for the increase.

State Reservoirs

Continue to Fill

12-28-65
Arizona Republic

DECEMBER storms which tripled the stored water in the Salt River Project's lake system continued yesterday to fill six major lakes with runoff from central Arizona watersheds.

But only at Horseshoe Dam, which was catching a vigorous Verde River flow, was the project forced to release water over the spillway gates at the top of the dam.

At Stewart Mountain Dam, which backs up Saguaro Lake, water continued to flow out of the normal release channel at nearly 2,700 second-feet yesterday.

A SPOKESMAN said Roosevelt Lake, which was more than 86 per cent full, still was receiving nearly 150,000 cubic feet of water per second. However, if it is necessary to spill

water from either Roosevelt or Bartlett lakes, it won't occur until at least Monday or Tuesday, said the spokesman.

The project said spilling is not anticipated unless warm weather in the watershed country accelerates the melting of snow, or unless a new rain-storm sweeps over the area.

The project's lake system, which a year ago contained a total of nearly 500,000 acre-foot, late yesterday held more than 1,826,567 acre-feet.

Total capacity of the Salt River Lakes system is 2,072,050.

PRESENT contents of the lakes exceeds the following amounts (in acre-feet):

Roosevelt, 1,188,535 (total capacity, 1,381,580); Apache, 243,523 (total capacity, 245,138); Canyon, 57,326 (total capacity, 57,852); Saguaro, 63,433 (total capacity, 69,765); Horseshoe, 138,000 (total capacity, 139,238); and Bartlett, 135,750 (total capacity, 178,477).

Horseshoe Dam was at its maximum level. Automatic spillways continued to dump enough water to match the input.

Below Horseshoe Dam at Bartlett Lake, project spokesmen said approximately 50,000 additional acre-feet can be accumulated before water must be released there.

AT STEWART Mountain Dam, water is expected to continue to flow from Saguaro Lake until at least tomorrow, a spokesman said. The flow might be cut off or reduced earlier if the temperatures along the watershed drop.

Meanwhile, the output from Saguaro continued to flow past the Granite Reef diversion dam late yesterday, feeding more water down the normally dry Salt River through Phoenix. Water reached a peak at Granite Reef Dam Thursday and has since slacked off.

Flood Areas

12-25-65 Welcome Sun

Arizona Republic

FLOODED AND rain-drenched sections of Arizona looked forward yesterday to a muddy but otherwise sunny and dry Christmas weekend.

Except for some snow in the northern mountains tomorrow, the Weather Bureau predicted little or no moisture anywhere in the state till at least Thursday.

Gov. Goddard flew over the flooded sections of the state yesterday, then declared a state of emergency existed. This allows use of special funds set aside by the Arizona Legislature.

The money will be administered by the Civil Defense Department and can be used only for repairing damage to public facilities such as sewer and water systems, public school buildings, bridges and roads.

Goddard was flown over portions of Pima County and over much of Pinal and Graham counties. One sector he inspected included the Casa Grande and Safford areas where floodwaters were receding.

State Civil Defense officials said 82 families will be homeless for Christmas, most of them flooded out of their homes by the overflowing Gila River.

Authorities were unable to predict when the displaced persons will be able to re-

turn to their homes or to give better than a vague estimate of damage throughout the stricken areas.

"I'd say the damage will run into the millions; but just how many millions, I don't know at this point," said state CD Director Carl N. Smith.

Runaway water in the Salt River sliced the Valley in half yesterday and turned back traffic at most of the crossings.

Traffic could use only five major crossing places last night: the bridge at Tempe, the Central bridge, Seventh and 16th streets, and the Maricopa Freeway.

CLOSED because water either washed out the roadways

(Continued on Page 14, Col. 1)

Get Out the Swim Fins, Men, The Chuckholes Are Filling

Arizona Republic

12-23-65

CHUCKHOLES and uncollected trash are going to be as common as Christmas trees in Phoenix during the holiday season.

The renewed vigor of the rains yesterday has expanded the city's chuckhole problem to its worst level since December 1959 and has pushed twice-monthly trash pickups behind schedule, said James A. Stokely, superintendent of street maintenance.

"Everybody is saying, 'I've never seen so many chuckholes,'" Stokely said. "Well, I haven't seen so many either."

"THE THREE days of sunshine were fine, but they weren't long enough to get us out of the chuckhole we're in."

Stokely said the rain yesterday will push trash pickup crews at least one day off schedule.

"There's going to be cut brush and grass in front of a lot of

houses over Christmas, I'm sure," he said.

THE RAINS "substantially interfere with our ability to maintain schedules," he said, because grass, oleanders and other uncontained trash items are more difficult to collect in wet weather.

There will be the usual garbage pickup Christmas and New Year's Day, he added, but trash pickups are suspended on those holidays.

As to the chuckholes, Stokely said, the city has spent at least

(Continued on Page 17, Col. 2)

More About Chuckholes Grow, Trash Collects

(Continued from Page 15)

\$4,000 since Dec. 10 in overtime wages in an attempt to combat the chuckhole problem.

PATCH crews will be worked overtime this weekend and on Christmas Day to carry on the battle.

Poor street construction is not the basic reason for the

chuckholes, he said. Chuckholes, in the main, are caused by heavy traffic, poor drainage and lack of paving.

The major arterials improved in the last five years or so with curbs and gutters for proper rain runoff are holding up well.

BUT streets with no curbs and gutters create big prob-

lems, he said. Water collects on the sides and seeps under the street, washing away the street base. Heavy traffic pounds the pavement into the washed-out pockets, creating the chuckholes, he explained.

Unpaved residential streets have been "shot" with oil and an oil cake surface simulating a pavement developed over the years, he said. This oil cake surface deteriorates rapidly in a rainstorm.

Heavy Snowfall In North

By THE ASSOCIATED PRESS

More snow and rain fell on Arizona over the night and the weatherman says the state can expect a whiter and colder Christmas.

Flagstaff reported three inches and Grand Canyon two inches of new snow this morning, while Kingman and Williams also received snowfall. To the south, some desert areas were hit by up to almost an inch of rain.

Weather bureau warnings went out this morning to motorists all over the state. Heavy snow was forecast for this evening in the north and more rain in the south.

The weather bureau said water could run high in desert washes and usually dry river beds.

In Phoenix, the rain totaled more than one-half inch over the night and some roads were closed by flooding in the county. Included were the Maricopa road southeast of Phoenix and 56th street near Guadalupe.

The snow level is expected to drop to 5,500 feet by this evening and snow accumulations of up to 6 inches are predicted over the night in the Mogollon Rim and White Mountain areas.

Chains were advised for cars traveling within a 30-mile radius of Flagstaff and Williams.

Some precipitation totals included .21 inch of rain at Tucson, .93 at the Mesa experimental Farm, .32 at Douglas, .35 at Yuma, .39 at Gila Bend and .82 at Nogales.

The weather bureau said temperatures will average 4 to 8 degrees below normal the next five days. It is expected to clear around the state Thursday, and will be colder Friday and Christmas Day. More mountain snows are forecast for the weekend also.

Temperatures were moderate this morning with a low of 16 at McNary for the lowest in the state.



SALT RIVER — Many Valley residents have wondered, from time to time, where the Salt River really is. A climb up Tempe Butte, on one of the current clear days, disclosed the fact that the river, normally dry these many years, actually has a well-defined chan-

nel, as shown by this photo taken with red filter and 400-millimeter lens. The river's serpentine course through the Valley, after emerging from the foothills of the Superstition and Mazatzal mountains at Apache Gap, is made evident by the present spilling of excess water over Granite Reef dam.

Water Runoff For December Tops All Previous Records

Water runoff into the Verde-Salt River water conservation system within the past two weeks was the greatest for any December in recorded history and amounted to more than the average total runoff for an entire year, a Salt River Project spokesman said this morning.

Flooding of the lower Salt River channel was diminished today, but in anticipation of

new rains in the upriver watershed, the downriver flow will be permitted to continue for an additional three to five days, it was indicated.

So nearly full are the reservoirs along both the Salt and the Verde rivers, little reserve capacity is now available for any immediate runoff for new rains or melting snows in the upriver watershed.

As of 10 a.m. today, total content of Roosevelt lake was 1,221,459 acre feet. This was a gain of 51,060 acre feet since Friday morning, when the reservoir held 1,170,399 acre feet.

In contrast with the 51-thousand acre-feet gain for the last three days was the 62,920 acre feet of gain in the 24-hour period from Thursday morning to Friday morning. A letup in the upriver rains, and colder weather in the higher elevations in the upriver watershed, accounted for the diminished runoff into Roosevelt lake. Warm rains last Wednesday and Thursday melted snows in the lower elevations of the Roosevelt watershed, but most of the lower-level snows have not been drained off, it is believed.

Should warm rain occur, or should warmer weather reach the higher elevations, more runoff would result. To receive such runoff Roosevelt now has a reserve capacity of only 160,121 acre feet remaining of its total capacity of 1,381,580 acre

feet, the SRP spokesman said.

Apache lake today contained 243,709 acre feet, which about equaled Friday morning's level of 243,523 acre feet. Apache, impounded by Horse Mesa dam, has a total capacity of 245,138 acre feet.

Canyon lake, next downstream from Apache, this morning held 54,286 acre feet, only a slight drop from Friday's level of 57,326 acre feet. Canyon Lake's total capacity is 57,852 acre feet.

Saguaro lake, impounded by Stewart Mountain dam, this

(Continued on Page 4)

SRP

(Continued from Page 1)

morning held 57,792 acre feet, as compared with Friday's 63,852 acre feet. With the 6,060 acre feet gain in reserve capacity, spill gates at Stewart Mountain dam were closed at 10 a.m. today. As of today, Saguaro lake had a reserve capacity of 11,973 acre feet of its total capacity of 69,765 acre feet.

Despite the shut-down at Stewart Mountain dam, however, water was flowing over Granite Reef dam today at a rate of 4,600 cubic feet per second, but by nightfall this flow probably will have dropped to 2,800 second-feet, the SRP representative said. The flow at the reduced rate — still enough to flood Hayden and Scottsdale road crossings and the crossing of the northbound lane of Mill avenue in Tempe, probably will continue from three to five days, it was stated.

Water still was being released in the Verde system from Horseshoe dam, where a total of 137,533 acre feet of water were in storage. Horseshoe lake has a total capacity of 139,238 acre feet. The water impounded in Horseshoe lake had increased by 4,266 acre feet since Friday morning. But with reserve capacity of 26,344 acre feet left from its total capacity of 178,477 acre feet, it was thought Bartlett lake could continue to receive water released from Horseshoe lake for another week without spilling. This estimate, however, was based on assumption of no further rains in the upriver watershed of the Verde.

Total runoff into the two-river storage system since December 1 has amounted to 614,000 acre feet, the SRP spokesman said. The average December runoff is about 40,000 acre feet. The amount received by the storage system, coming principally within a ten-day period ending Friday, amounted to more than ten times the average December runoff, and exceeded the historic 1923 runoff of 491,000 acre feet by 123,000 acre feet, about 25 percent.

Long Arizona Drought May Be Over

THIS WET SPELL in Arizona may mark the end of a dry cycle. If the story that tree rings tell Sam Turner is correct, the next 18 or 20 years will likely be a period of "average or above-average" precipitation that can be called a wet cycle.

Colorado River runoff will be up to its long-time average of 15,000,000 acre-feet plus not the 10,000,000 or so measured through dry cycles. The San Carlos reservoir may be filled for the first time. Other blessings will flow, but there'll never be enough rain to classify the Southwest as anything but an arid region with insufficient water for its expanding population.

The probabilities are that a wet cycle is starting, Mr. Turner insists. He admits that the series of storms which began in late November may be just another dry-cycle fluctuation but "the chances are against that."

"If I were a cattleman," he continues, "I would count on favorable range conditions for the next 15 or 18 years.

There'll be a poor season occasionally, but generally the cowman's moisture and feed will be good."

In support of his restrained optimism, Turner can point to an ocean of graphs, tables, dendrochronology reports and rainfall records in his office, 350 West Camelback, Phoenix. He collects every obscure fact bearing on the climatological history of the Southwest and projects the future on the basis of what is known to have happened in the past.

What Comparisons Tell

The calculations of Samuel F. Turner, former chief of U. S. Geological Survey groundwater investigations in Arizona, were first revealed in September of 1963. He testified before a Senate subcommittee that was considering a bill to authorize the Central Arizona Project, and submitted a long written statement. That statement was reviewed in Arizona Farmer-Ranchman for Oct. 4 of that year and he received letters from all over the world, asking

for more details.

It was some time after 1952, when he engaged in private practice as a consulting hydrologist, that Mr. Turner got interested in dendrochronology. This is the science of charting weather patterns by tree rings, which was invented by Dr. A. E. Douglass of the University of Arizona. Its basis is the fact that the annual growth rings of long-lived trees, such as pines, vary with rainfall. A thick ring means that there was abundant moisture the preceding year, a thin ring the opposite.

Arizona tree ring records then available went back to 1600 but there were records for the Colorado Basin above Lees Ferry, back to 1250.

There were Weather Bureau records for Arizona back to 1855, stream, flow measurements to 1900. These last covered one long wet cycle followed by a long drought.

In Full Agreement

But the tree rings show that there were also wet and dry cycles of roughly

the same length as far back as 1250.

The average number of years from the start of one wet cycle to the beginning of another was 57. Shortest interval was 41 years and the longest, 77. This last was the great drought that began in 1250 and drove the Ho-Ho-Kam from Central Arizona.

The rings show other wet cycles starting in 1365, 1490, 1548, 1603, 1824 and 1904. There were major dry cycles between and one 200-year stretch with only minor cycles of both kinds.

If averages mean anything, it's time for another wet cycle to get under way — and right now Arizona could be in the first stages. On the other hand, these storms could be nothing more than accidents and the dry cycle be resumed.

There were fairly good rains in the summer of 1963 and Turner thought they might mark the opening of a wet cycle. They proved to be only a variation. But now the evidence is much stronger that the abundant rains of late 1965 (and probably of early 1966) are the beginning of a period of fairly abundant moisture.

A wet cycle, Turner carefully explains, is one in which precipitation equals or exceeds the state average of 13.41 inches. A dry cycle is one in which precipitation is average or below.

While Records Fall

"Wetness" seems to proceed from north to south, Turner observes. Flagstaff, for instance, had a fair amount of precipitation in 1964 and by Dec. 23, 1965, had beaten its 1905 all-time record of 34.53 inches. Tucson announced that it was having the wettest December ever. Other communities over the state were equaling or breaking records. It was virtually sure that the Salt River Project's reservoirs would be filled for the first time since 1941, and earlier than in that year.

Given anything like normal conditions next spring, Turner said, Colorado runoff will be several times the 10,000,000 acre-feet that pessimists have been claiming is average. His own figure for all wet and dry years back to 1900 is 15,002,000 acre-feet.

The San Carlos Project, he adds, was "planned on the basis of a wet cycle. Now, if a dry cycle is really over, it will finally pay off. The big dam up on the Gila will prove its worth."

But not everything will be pleasant when the spring thaw starts melting the snowbanks in the highlands, Turner cautions. Even though weather conditions are unfavorable, if most of the accumulated moisture is lost into the atmosphere, there'll still be considerable runoff. But a warm rain on top of the snow can convert every arroyo into a torrent.

"There can be millions of dollars in flood damage," he concluded.

As he spoke, radio announcers were spreading the news that floods had already done damage amounting to millions of dollars around Tucson, Marana and Picacho, and along the Upper Gila.

—AFR—

PHOENIX — Paul Neitz has been re-elected to serve as a member of the board of directors of Pure Gold, Inc., of Redlands, Calif. Neitz is the only member from Arizona. Others re-elected at the 60th Annual Meeting were: Burton W. Tilden of La Sierra, president; Russell J. Franz of LaVerne, vice-president; Emmett Osburn of Redlands, secretary; John M. Van Horn, executive vice-president; L. R. Handley, assistant secretary and treasurer. Others directors are: Gordon B. Lane of Anaheim, Jack Singer of Claremont, and Jack W. Wiley of Redlands.

Tempe Daily News
1-11-66

SRP Closes Spillways; Eyes Upland Weather

The release of water from all Salt River Project Dams was shut off by 6 p.m. Monday, January 10, for a possible 18-day period to permit emergency repairs to roads and public facilities in the Salt River channel.

However, it was emphasized by SRP General Manager Rod J. McMullin that the channel dry-up depends entirely on weather conditions on the Project watershed remaining at the present status. He said unanticipated rainfall or melting snow resulting in increased runoff into SRP reservoirs could necessitate reopening the spillgates at the dams. In this case, all advance warning possible would be given to agencies working in the channel.

This dry-up plan was announced Friday to about 60 representatives of 19 public agencies in the Salt River Valley area and to the public.

It is expected to be about 48 hours before water from the Salt and Verde River systems ceases to flow over Granite Reef diversion dam, and perhaps another day or two before the river channel through the metropolitan areas is dry enough for construction work.

Restoration of the most essential Salt river crossings will be given priority by the Maricopa county highway department, Sam Lanford, county en-

gineer, said. Scottsdale and Hayden roads will be among the first crossings to receive attention as soon as the water is out of the way, he said.

It is probably that immediate work will be limited to providing a usable surface at the road left by the river's flow, he indicated, with oil treatment to stabilize the temporary crossing. Should there be further flow in the river before next summer's expected dry weather, this method would hold new damage to a minimum, he pointed out.

FROM FLOODS

Amber
1-11-66

New Perils: Drownings, Mosquitoes

Stagnant waters left over from Arizona's recent heavy rains and floods present the prospects of drownings, disease and an unusually severe mosquito infestation.

This was the observation today of State Health Commissioner William J. Moore, who cautioned parents to "keep their children away from such waters."

Two of Dr. Moore's aides underscored some potential dangers.

"WHERE THERE is water lying around you are going to have children in it," Dr. Fredric Baum, chief of the department's maternal and child health section, said.

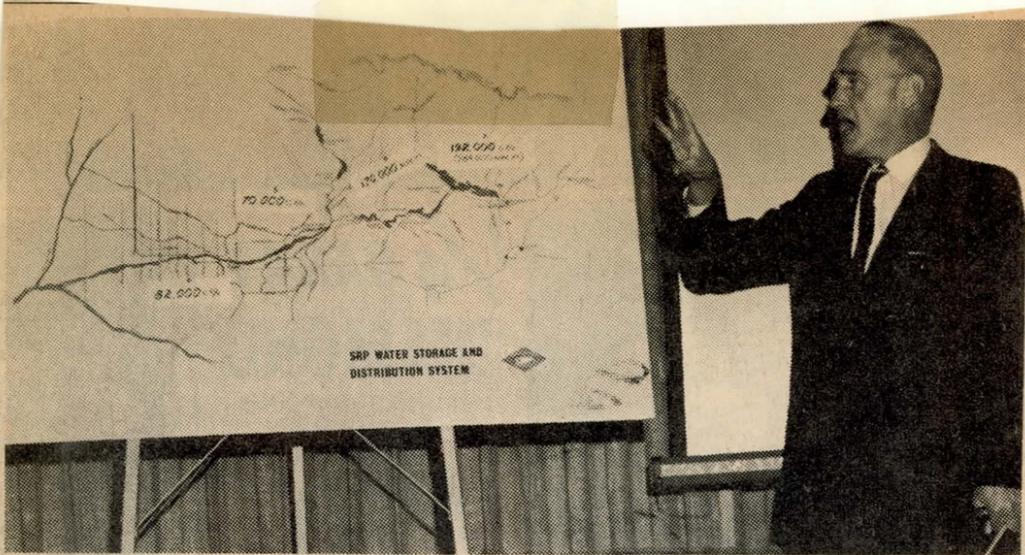
"I long have been concerned about dangers from our canal systems, but I am doubly concerned over dangers of these new waters because their qualities are unknown."

Dr. Baum said parents may not know locations of some of the left-over pools, thus would not explain hazards to their youngsters. Also, the waters could have dangerous dropoffs and, in some cases, dangerous currents, he said.

DR. P. M. Hotchkiss, chief of the department's acute communicable disease division, said waters attract animals which drink and wallow in them.

Infected animals often pollute pools of water with germs of a disease named leptospirosis. This can be picked up by persons swimming in the pools, Dr. Hotchkiss said.

"If the waters remain any length of time there will be a whale of a mosquito problem," according to Dr. Hotchkiss. "With any increase in the mosquito population, there is added danger of outbreaks of encephalitis (sleeping sickness)." Encephalitis is transmitted to man by several species of mosquito.



SAYS SRP FLOW IN LIMITS — Using this map of the Salt River Project system to illustrate his address, SRP general manager Rod McMullin yesterday told Mesa Rotarians the project's controlled water releases were within limits of the Salt River flood control rating. "The flood control district in 1962 rated the river at 82,000 cubic feet per second," said McMullin. "That's the rating of the river, not the river with anything in it." SRP controlled releases, he said, never exceeded 70,000 cfs, but this was swelled to 75,000 cfs by tributary runoff below SRP dams. (Tribfoto)

Mesa Tribune

Snow Deep on Watershed, SRP Chief Tells Rotarians

1-13-66

An informal report on Salt River Project watershed conditions and a recapitulation of events leading to release of waters from Verde and Salt River dams was given to Mesa Rotary club members yesterday by Rod McMullin, SRP general manager.

"Watersheds are saturated, and there's still 18 to 20 inches of snow at the 8,000 ft. level and above," McMullin, advised Rotarians at the Mesa Country Club noon meeting yesterday.

McMullin, who stressed the informality of his remarks, pointed out the SRP is now storing water for use in "that dry season that may be coming in the 70's."

Speaking of the recent release of water on the SRP system, McMullin noted "there is criticism that we did not act as a flood-control agency. The facts of life are that we are a water-storage agency."

The SRP "recognized its public responsibility" during the recent water release, said Mc-

Mullin. "We don't take responsibility for calling everyone in the river bed," pointed out McMullin, although all types of news media were informed by the SRP of its proposed water releases.

During a question-and-answer session, McMullin stressed that public ownership of the river bed, rather than private, is a part of the county flood control program upon which the public will be voting March 8.

McMullin stated that it was not the SRP's intention that there be a big flow down the Salt River, and it had been

planned that water from dam releases would arrive in the Valley during daylight hours.

Heavy rains in Prescott threatened the Verde watershed, however, and tributary flows - particularly Sycamore Creek - swelled the Salt River below SRP dams, said McMullin. This brought water to the Valley area earlier than had been planned.

The SRP general manager illustrated his address with slides of the year-end river conditions, plus a map on which he traced the controlled releases in the Salt River Project System.

It's Woman's World: Mesa Men Shown Minority Group

Got a sneaky feeling, fellows, that the man's world is turning into a woman's world?

You're right - at least in Mesa. According to the official census figure just released, Mesa has a population of 50,529 - 24,658 males and 25,871 females.

Other break-downs of the Oct. 18, 1965 official census figure show the city's white population to be 49,653, with 876 nonwhite. Of the white population, 24,263 are males and 25,390 females.

In the nonwhite category,

395 are male; 481 female.

White or non-white, fellows, better mark Nov. 9 as a red-letter day on your calendar - that's the next Sadie Hawkins Day!

Iran, Russia Sign Agreements

MOSCOW (AP) — Iran signed trade and aid agreements with the Soviet Union today covering Soviet help for a new iron and steel works to be built near Isfahan.

Iran will pay for the help with natural gas piped to Russia.



ROAD END — Twisted guard rail on Country Club Dr. shows path of waters which swept out highway (top left) in this northernmost channel of the Salt River. State highway department men and equipment today worked on the emergency roadway (foreground) which is expected to be open to auto traffic this weekend. (Tribfoto)

Ph. Gazette
1-18-66

Cold Spell Holds Back Runoff

Anxious eyes followed a storm sweeping across Arizona today.

Observers wanted to know when rain and snow would result in major runoff into the Salt and Verde rivers. Phoenix and the Valley are still suffering from damages inflicted by floodwaters that inundated the bed of the Salt River at New Year's.

SALT RIVER Project officials said there is no flood threat at the present time. Reports from the watersheds indicated that precipitation there was in the form of snow with freezing temperatures holding back runoff. Rainfall at lower elevations was called moderate.

Promise of increased runoff when the weather warms came with a report that moisture content on Arizona watersheds is 200 to 300 per cent of normal at this time of year. Project officials are preparing for this by lowering the level of storage reservoirs.

The heavy moisture content covers Gila River watershed as well as the watersheds of the Salt and Verde.

REPORTS ON the state's first big storm of the year showed most areas receiving precipitation. Many areas were overcast with more snow and rain predicted.

Show Low Airport had 6 inches of snow on the ground and the moisture content for the new precipitation was .83 of an inch.

Superior reported 1.04 inches fell in the mining town during the night.

THE HIGHWAY between Safford and Clifton was closed because of heavy rains in the Safford area and snow in Clifton.

St. Johns, Flagstaff and Winslow reported new snow today, with measurements up to 6 inches.

Precipitation totals at 11 a.m. included: Douglas .51; Flagstaff .20; Ft. Huachuca .50; Nogales .99; Gila Bend .76; Payson .51; Prescott .09; Tucson .69; Winslow .43, and Yuma .38.

MAVERICK, high in the White Mountains, received 5 inches of snow during the night. This brought the total on the ground to 23 inches.

Skies were clear at Grand Canyon Village at dawn, but by 8 a.m. clouds covered the area and snow was falling.

Snow covered Four Peaks near Roosevelt Dam.

Henry Shipley, assistant general manager of Salt River Project (SRP) in charge of water and irrigation, said that the project was releasing no water today at Granite Reef Diversion Dam, northeast of Phoenix, although some water may flow in the Salt River bed from local drainage.

NEW SNOW measurements, comparisons and lake storage compiled today by Richard

Turn to **STORM** on Page 8

★ ★ ★

● STORM HITS STATE

Concluded From Page One
Enz, snow survey chief of U.S. Soil Conservation Service, from mid-January field measurements included:

Along Mogollon Rim, on Salt River drainage, Workman Creek snow course has 300 per cent of average precipitation for the November-mid-January. Water content of the 25.19 inches of snow and rain compares with a long-time average of 8.39. Heber's precipitation total is 16.77 inches for the period, average 6.19.

Hannagan Meadows on Colorado Trail has 14.31 inches of precipitation for the same period. The average is 6.86.

SNOW DEPTHS of packed snow, with high water content, at mid-January included:

Sheep Crossing on Little Colorado (Baldy Course) 30 inches of snow with 8.7 inches of water content. Hannagan Meadows has 40 inches of snow with 12.3 inches of moisture.

On Verde River snow courses, Happy Jack logging camp, on Mogollon Rim has had 13.5 inches of precipitation in two

and one-half months. Average is 5.40. Mingus Mountain has had 11.98, with average 4.39.

Shipley said January through May runoff of the Salt River System is estimated at 1,224,000 acre-feet, compared with average of 473,000. Low for the period in 1955 was 134,000 in 1955 and high 3,075,000 in 1916. March-April runoff is expected to exceed the average for the entire five-month period, a two-month runoff now estimated at around 650,000.

THE WEATHER bureau warned that the snow level on the south slopes of the Mogollon Rim across east-central Arizona would drop to about 4,000 feet elevation during the day. Accumulations of 4 inches or more are indicated.

The measurement at Sky Harbor reached .30 at noon, with .04 of that amount after 5 a.m. precipitation for January normally is .73. Last January, the total was 1.22.

IN DOWNTOWN Phoenix, where raincoats and umbrellas were a must for thousands of office workers, the rainfall was slightly heavier. The observer at the main post office reported .29 up to 5 a.m.

THE WEATHERMAN said the storm is what is known as a "cold low" — meaning it has a "cold upper level low pressure" and covers a wide area.

The weather outlook:

Valley of the Sun—Clearing skies in the evening and a temperature range tomorrow at Sky Harbor from 39 to 64.

Globe-Miami and southeastern parts of the state—rain in the valleys and snow above 4,500 feet through the evening with clearing skies and lower temperatures tomorrow.

SHOW LOW-McNary — Snow depths to increase by 4 inches or more by late evening, with partly cloudy skies and a few snow flurries tomorrow.

Cottonwood and the Verde Valley — Showers, then clearing but cloudiness increasing late tomorrow.

Prescott — Snow diminishing, then clearing skies and lower temperatures during the night, but cloudiness increasing late tomorrow.

Gila Bend Rainfall Exceeds Average

Special to The Gazette

GILA BEND — Rainfall here — heaviest precipitation reported in Maricopa County during the 24 hours up to 5 a.m. today — already exceeds the January average.

The latest measurement, 1.76 inch, exceeds the January average by .19.

In 1965, rainfall was above average during the first five months and the last two months.

New Watch
Mesa Tribune
Set at Lakes 1-18-66

By THE ASSOCIATED PRESS

A new winter storm brought snow and rain to Arizona Monday night as a new watch began on Salt River reservoirs.

Snow touched most of the higher elevations of northern Arizona and was replaced by rain in other spots below 4,000 feet. Snow or rain was general over the state with Superior reporting more than an inch by this morning and Nogales just a trace under an inch.

No immediate flood danger was forecast in the Phoenix area although a Salt River Project spokesman said a close watch is being kept on the six Salt and Verde river reservoirs.

Should the rains continue, the spokesman said new releases may be necessary. This would halt the 18-day dry-up recently begun to repair damage and reopen several valley crossings.

The Arizona Highway Patrol said Show Low had about 4½ inches of snow this morning, Pinetop close to seven with considerable snow in the Globe-Miami area.

Flagstaff had an inch this morning with the prospect of more during the day.

Roads were reported to be slippery and hazardous in all the snowy areas. Chains were advised for all travel within 40 miles of Flagstaff and Williams.

Forecasts call for more intermittent snow tonight in northern Arizona with some locally heavy showers over southern half of the state.

Phx Gazette
\$16 Million In City
1-18-66
Projects Approved

The Phoenix City Council today approved a \$16 million improvement program to be financed by revenue, gasoline tax and general obligation bonds.

The council's action followed approval of the capital budget by the Citizens' Bond Advisory Committee.

Major projects authorized in the new budget include construction of a 20-million-gallon water reservoir near South Mountain,

installation of major water lines in northeast and South Phoenix, construction of a series of storm sewers across the city's mid-section, construction of a \$200,000 tennis center and acquisition of additional park sites.

In other actions today, the council:

- Thanked the Phoenix Association of Insurance Agents for the gift of a \$500 portable resuscitator to Sky Harbor Airport. It was presented by Thomas J. Ryan, president, and Gordon Shoaf, secretary of the association.

- Authorized a \$9,750 fee for Stanford Research Institute to analyze the convention center auditorium needs of the city.

Phx Gazette
Flood Claims
1-18-66
Examined

Gazette's Tempe Bureau

TEMPE — Acting City Manager Gale Christy presided at a meeting today to dismiss flood claims against the city.

Municipal officials and the city's insurance adjuster studied the 10 claims arising from damage resulting from the recent Salt River flood.

Christy said he has been advised the city probably has no liability but the meeting was to decide future actions dealing with the matter.

Flood Relief Workers
Deserving Of Applause

Many thanks to a congenial and efficient group of people with whom I worked during the flood relief crisis. I refer to the Arizona Red Cross and the Phoenix High School lunchroom employees.

Phx Gazette
MRS. MYRTLE FITZSIMONS
1-18-66

Rate of Spring Snow Melt To Determine River Flow

2-2-65 Arizona Republic

Reservoirs Close to Capacity

WHETHER the Salt River will go on a rampage through the Valley in the spring depends on the timing of the runoff from melting snow.

This was the appraisal made yesterday by Richard W. Enz, snow survey supervisor for the U.S. Soil Conservation Service.

"The whole thing hinges on whether the runoff comes in one big peak or gradually over the months of March, April and May," he explained.

Enz estimated that the snow now blanketing the watersheds of the Salt River Project reservoirs, plus that which will fall during the remainder of the winter, will produce 800,000 acre-feet of water.

The combined contents of the six reservoirs was 1,861,772 acre-feet yesterday, 215,000 acre-feet below capacity. The amount of water stored is 2½ times greater than the average for this date, said Enz.

THE SNOW cover on the Salt River watershed, he added, has double the water content it usually has at this time of the year. On the Verde River watershed, which also contributes to the SRP reservoirs, the snow is 18 per cent above the 15-year average.

In the estimation of the snow expert, it will be virtually impossible to avoid releases of a substantial portion of the spring runoff. The degree to which the release can be controlled, he said, depends on the distribution of runoff peaks.

The deepest snow measured in the state is almost 100 inches in the White Mountains. The Snow Bowl, at the 11,000-foot altitude near Flagstaff, has 58 inches, Enz said.

THE HEAVIEST snowfalls, he pointed out, have been on the Gila River watershed. Although the 375,000 acre-feet of water now in San Carlos Reservoir, on the Gila River, is only 31 per cent of capacity, this is almost six times the amount normally stored on Feb. 1.

Enz predicted that many smaller reservoirs will be filled by spring. These include Lake Pleasant, which is nearly filled now, and Lyman Reservoir, now 65 per cent of capacity.

Mesa Tribune

2-16-66

Watershed Snow Pack Heavy But Still in Deep Freeze

PHOENIX (AP) — The Salt and Verde watershed snow-packs are the heaviest in many years, but frigid weather was keeping potential rivers locked inside.

Richard Enz, U.S. Soil Conservation Service snow surveyor, said today there's no sign of sudden thawing.

Snow depth, he said, ranges up to 109 inches at 11,000 feet on Mt. Orr, a peak on the Salt watershed. Snow cover on the watershed was 80 per cent

above average and 40 per cent over the normal on the Verde watershed.

The Gila watershed has 300 per cent more snow than usual, Enz said, and Mt. Lemmon, north of Tucson, has a 67-inch pack — the most since government records were begun in 1948.

The unfilled capacity of the six Salt River Project reservoirs was 199,500 acre-feet Tuesday, about 500 acre-feet under the desired level. "

Help Pass Bond Issue

Editor, The Arizona Republic:

I'm sure that tourists, during the past month, have not had to ask the reason for a bridge over the Salt River.

Trouble is, in the future there may be fewer tourists to ask this usually reasonable question. Stories, pictures, and films that reached other parts of the country over-emphasized the situation. Many of my friends received calls from relatives wanting to know if they were okay, even though they live miles from the river.

Unfortunately, the recent flood and ones before it have happened. But what are we going to do about the future?

THE MARCH 8 county-wide bond election appears to be the only solution and I understand if we "muff it," it may be some 10 to 15 years before the Army Corps of Engineers will take action again. It's not like a school election that may be lost one year and won the next.

The drop-off in tourists is only one of many problems resulting from floods that cost us all money. The constant rebuilding of bridges and roads is extremely costly — and who is paying for this? All of us, in one way or another. In addition, much private property is damaged and, in some instances, physical injuries sustained and considerable time lost in being unable to go about our normal way of life.

I hope too many people don't take the "What's in it for me?" attitude as a reason not to vote.

WITHOUT flood protection, taxes for road and bridges repair will increase for homes on the side of the mountains as well as in the lowlands. A severe economic loss in the lowlands will indirectly affect the people in the house on the side of the mountain.

I think it all adds up to this, if flood control is good for a major portion of the county, then it's good for all. We are our brother's keeper, so let's look out for his interest too.

And just being in favor of the bond election won't do it, either. You have to get to the polls March 8 and vote YES.

JAMES L. HECKMAN

Aciv. Rep

1 2/17/66

More Wet Weather Due, but No Flooding



Republic Photo by Dorila Marting

'SNO FUN — Shorty, pet pal of the Ballejos family of Winslow, apparently prefers the warm indoors to playing in 8 inches of snow. Raymond Ballejos, 5, seeks to detain Shorty and brother Robert, 9, does all the work. The snow Tuesday topped January records for the past 16 years at Winslow.

WET WEATHER may linger awhile in Arizona.

Rain or snow, which stopped falling only yesterday, is forecast over most areas of the state tonight and tomorrow. Scattered showers are expected in the Valley.

A WEATHER Bureau spokesman said there is no indication when the current pattern of storms will end.

"Storms are typical of winter, you know," he said.

Salt River Project authorities said below-freezing temperatures in the high snow country continue to prevent another flood in the Valley.

Yesterday's flow rate of 2,383 cubic feet per second into the project's six lakes was slightly less than the preceding day's. Although snow flurries are expected to continue on the SRP watersheds, a five-day forecast calls for below-normal temperatures.

THE PROJECT still believes it can keep its commitment to halt the flow of reservoir water into the Valley for the full 18-day period ending Jan. 28.

"After that, we'll take a new look," a spokesman said.

There had been no significant change in the lakes'

(Continued on Page 19, Col. 2)

Ariz. Republic

1-20-66

More About

Wet Weather on Way

(Continued from Page 1)

water levels since the latest series of storms began, he added.

Although little moisture fell anywhere in the state after midmorning yesterday, some sections reported moderate overnight snowfalls. The heaviest was at Maverick, which measured .54 inch of moisture content.

PRECIPITATION records of other areas for the 24-hour period which ended at 5 p.m. yesterday include:

Carefree, .20 of an inch; Ft. Huachuca, .14; McNary, .45; Nogales, .23; and Payson, .12.

Snow depths included: Maverick, 26 inches, with 5 inches of new snow; Payson, 3, and Williams, 2.

Thanks To December Storms

Most Water, Best Feed Since 1941

Rosy Outlook For Every Irrigation District With Storage — But Floods Have Done Much Damage And Spring Runoff May Bring Other Deluges

NEVER DID THE water prospects of a rid Arizona change so dramatically as they were changed by the series of storms that stretched from Thanksgiving Day, 1965, to New Year's Day, 1966.

They were changed from distinctly not encouraging to the brightest they have been in a quarter of a century. The good far overbalances the flood damage which, so far as farms are concerned, was pretty well confined to Pima, Pinal, Graham and Greenlee Counties.

The ranges are soaked. Cattlemen are assured the best feed and water

they have had since 1941, and it may be better than that.

And there's more to come. Snows are deep on the watersheds, although nearly all snow up to 8,000 feet elevation was melted by the last storm. This can easily be replaced by another storm. Even if spring weather is unfavorable, there is bound to be still more runoff into the reservoirs and more moisture seeping into range soil.

The more astonishing, the most terrific, news of all is that the reservoirs of the Salt River Project are full to their capacity of 2,072,000 acre-feet.

Or, if they're not quite full, it's because some vacant capacity is being maintained to ease the danger of flood to Phoenix and its environs when runoff is accelerated. Enough water was being released to leave 200,000 acre-feet of unoccupied space, but there was still quite a stream flowing down Salt River. So all gates were closed on Jan. 10 to dry up the Salt and afford time for repairs to road crossings, gas lines, and domestic water mains. For all practical purposes the reservoirs are full and they will be full well into the summer. Some 180,000 acres of farmland in Salt River Valley is as-

sured of sufficient water for at least three or four years.

In December the Gila increased storage in the San Carlos reservoir from 9,290 to 253,400 acre-feet, and at this writing it has risen close to 300,000. This is a long way from capacity of 1,200,000 acre-feet, but some competent hydrologists think there is an excellent chance of the spring thaw filling San Carlos for the first time in its history that goes back to 1929.

For the first time, enough water flowed down the Salt and Gila to result in detention behind Painted Rock Dam, northwest of Gila Bend. It is doubtful, however, if there would have been any flood damage farther west, in Yuma County, if the dam had not been there to check the flow. At one time the impoundment was 200,000 acre-feet and it was being released at the rate of 2,500 cubic feet per second.

Also Lake Pleasant

Storage in Lake Pleasant, on the Agua Fria, is up to capacity of 157,500 feet. Or if it is a little less than full, it's because a little water is being released for safety's sake. Maricopa Municipal Water Conservation District, commonly known as the Beardsley project, may have more water this year than since Waddell Dam was built to impound Lake Pleasant.

Smaller irrigation reservoirs over the state are spilling over, notably the one behind Lyman Dam at St. Johns. Another is Lake Watson, north of Prescott, which supplies part of Chino Valley's water.

On the Colorado, December raised the contents of Lake Powell 40%, to 8,765,000 acre-feet. Farther down, in Lakes Mead and Mohave, the increase was 36%, to 16,971,000. Gains have continued through every January day. The U.S. Geological Survey predicts 9,300,000 acre-feet more from the spring thaw starting in April.

Superlatives Plus

A special report from the USGS Water Resources Division, at Tucson, bristles with impressive figures and percentages. Such as — —

Flood damages have been estimated as high as \$7,000,000, but with no loss of life.

Some peaks of stream flow were the highest since 1916, and overall were the highest on record.

Runoff in December exceeded normal for an entire year.

December discharge of Salt River above Roosevelt was 27 times normal; Verde flow was 16 times normal and the highest in 62 years of record.

Yes, there was some improvement in groundwater levels. The USGS, however, says flatly that this is "only a small fraction of the amount pumped annually. . . ."

"Rises in water level were greatest in wells nearest the river channels. The level in a well near the Santa Cruz River at Tucson rose nearly 47 feet during the month, and was about six feet above the long-term average for December. Other water-level rises ranged from less than half a foot to more than six feet, although for the most part these levels were still below the average for December. The water level declined in a few of the wells measured, but the declines were negligible."

Flood Bond Proposal To Voters In March

MARCH 8 is definitely the date for Maricopa County's flood bond election. Originally, Feb. 8 was tentatively set but it was decided that more time would be needed to make all arrangements and acquaint property-owning citizens with details of the bond proposal.

It is proposed to issue \$22.7 million worth of bonds as the county's share of a \$115.6 million flood control program. Remainder will come from federal sources.

The planning has all been done and sites selected for a number of dams, dikes, channels and levees. These will be constructed by the Army Corps of Engineers or Soil Conservation Service. The county must provide rights-of-way, modify certain roads and bridges, and then maintain control works after they are completed.

ARIZONA FARMER-RANCHMAN for JANUARY 22, 1966

Dry-Up Time *Mesa Tribune* Is Extended *1-26-66* By Project

State highway department maintenance personnel still at work today in deepening the Salt River channel north of Country Club Dr., were given an extension of the date water may be released again into the river.

The Salt River Project announced today that, depending upon weather conditions, it probably will be possible to extend the river's dry-up period to Feb. 4.

When it started the dry-up, Jan. 10 to permit emergency repairs in the river channel, the SRP had planned to stop releases for only 18 days. The end of this dry-up had been scheduled for Friday of this week.

Cold weather on the project's 13,000 sq. mile watershed, however, has been holding run-off to a bare minimum and the SRP has been able to keep its storage "hole" above the 200,000 acre ft. minimum needed as a cushion against sudden run-offs.

"Any warm rainfall or high temperatures that would melt the snowcap could still result in an overnight change of plans," said Henry Shipley, assistant general manager of the SRP. In this case, agencies working in the river channel could not hope to receive more than a 24-hour warning to remove their equipment from the river bed, he said.

Unfilled capacity of the SRP system today was announced at
(Continued on Page 8)

River to Stay Dry Longer

(Continued from Page 1)

212,878 acre ft. The extended weather forecast through next Tuesday calls for lower than normal temperatures in the SRP watershed.

Cliff Potts, assistant district engineer of the state highway department, said work on the river channel at the Country Club Dr. crossing is expected to be completed by Friday or possibly Monday.

The channel is being cleared for half a mile upstream from Country Club Dr.

In anticipation of the resumed releases in the Salt River, workmen from the state highway maintenance department had four bulldozers in operation today deepening and widening the river channel east of Country Club Dr. crossing.

Repair work on the Bee Line Highway crossing of the Verde River, northeast of Mesa, was expected to be completed today by state highway department personnel. Black-topping of the roadway was finished yesterday.

Dry-Up In Salt River Bed Is Extended For One Week

7-11 Daily
1-26-66

Dry-up of the Salt River, originally planned to end this Friday, may be extended until February 4 to permit continuation of repair work to roads, utility lines and other works in the river bottoms, the Salt River Project announced today.

er than it was during mas-New Years week flow was confined to existing low-flow ch steel culvert built for dale road crossing it possible to keep

Excess watershed runoff which had been turned into the historic channel of the Salt on December 31 was shut off January 10. At that time the Project announced intention to keep its reservoir dam spillways closed for an 18-day period, if possible.

Henry Shipley, assistant general manager of SRP, in charge of water and irrigation facilities, said today that the cutoff would be continued on a day-to-day basis until February 4 if possible. He warned, however, that the Project's reservoirs still contain only 12,878 acre feet of reserve capacity, and that a weather change over the project's 13,000 square mile watershed might change the situation overnight.

Any warm rainfall or high temperatures that would melt the watershed's snowcap might force the re-opening of the spillways anytime before February 4, he said, adding that "in this case agencies working in the river channel could not hope to receive more than 24 hours' warning to remove their equipment from the channel."

One reason the time extension of the dry-up is possible is the continued cold weather and lack of new rains on the watershed, holding runoff to a minimum, Shipley explained.

Decision to hold off the re-opening of the spillways, he said, resulted from the fact that "a number of the agencies now making emergency repairs of facilities in the channel have

requested a few more days to complete their work."

Workmen for the county highway department are attempting

(Continued on page 12)

Phoenix also

n the wat-reservoirs calculate capacity for about

city of the as 212,878 Project a e feet over safety level in anti-rains and

r u n o f f vels to the 200,000 acre capacity is d, "we will only enough reservoirs to through the iter the un-nes reduced we will have tion of the t needed to The amount iver channel between 1,000 t per second t he warned be increased portion to the n watershed

cooperation Conservation another com-survey next

"We expect to have the results of the survey by February 8, and will then have a more accurate picture of what is ahead."

At 9 a.m. today the inflow into Project lakes, from the Salt, Tonto and Verde rivers, was 1,245 cubic feet per second. Releases at that time totaled 950 cubic feet per second, which was being handled by canals to fill water orders.

SRP Dry-Up

(Continued from page 1)

to build a new detour for the Scottsdale road crossing which may make continued use of the crossing possible after water is again released into the river channel. If the flow is no greater than it was during the Christmas-New Years week, when the flow was confined to the then-existing low-flow channel, the steel culvert built for the Scottsdale road crossing may make it possible to keep the road

open.

Utility company crews still are at work on repair of electric and gas lines, and several street crossings in Phoenix also are still under repair.

Present runoff from the watershed into the SRP reservoirs made it possible to calculate that existing reserve capacity would not be used up for about another week.

Unfilled total capacity of the reservoirs today was 212,878 acre feet, giving the Project a leeway of 12,878 acre feet over the 200,000 acre-foot safety level it wants to maintain in anticipation of the spring rains and snow melt.

Until the present runoff brings the lakes' levels to the point at which only 200,000 acre feet of reserve capacity is reached, Shipley said, "we will continue to release only enough water from the reservoirs to meet water orders, through the Project's canals. After the unfilled capacity becomes reduced to 200,000 acre feet we will have to release that portion of the inflow which is not needed to fill water orders." The amount released into the river channel probably will be between 1,000 and 2,000 cubic feet per second at first, he said, but he warned that the flow will be increased at any time in proportion to the amount received in watershed runoff.

The Project, in cooperation with the U. S. Soil Conservation Service, will make another comprehensive snow survey next week, Shipley said.

"We expect to have the results of the survey by February 8, and will then have a more accurate picture of what is ahead."

At 9 a.m. today the inflow into Project lakes, from the Salt, Tonto and Verde rivers, was 1,245 cubic feet per second. Releases at that time totaled 950 cubic feet per second, which was being handled by canals to fill water orders.

State Water Storage Highest In 25 Years

Hazette

2-3-66

The dry-up in the Salt River below Granite Reef diversion dam has been extended until at least over the weekend, Henry Shipley, an assistant general manager of the Salt River Project, said today.

A stable snow-cap on the project's vast water shed has made it possible to extend the dry-up period for the second time. The first extension was from last Friday to this coming Friday.

Shipley said the unfilled capacity in the project's six reservoirs was 210,316 acre-feet today. Project officials feel it is safe to maintain the dry-up as long as the unfilled capacity remains above 200,000 acre-feet.

Hazette

2-2-66

Big Runoff Also Seen For Spring

Water storage in Arizona reservoirs is at the highest level in 25 years, and spring runoff is expected to be twice the average.

New surveys of snow cover on Arizona watersheds show that the moisture content is so high that some of the runoff will have to be wasted down the rivers when the spring thaw comes.

RESERVOIRS ON the Salt and Verde rivers are expected to receive 824,000 acre-feet of water from those streams and Tonto Creek during the February-May runoff period, according to a forecast completed today by the U.S. Soil Conservation Service.

Within Arizona, the only major reservoir not expected to fill and spill this spring is Lake San Carlos on the Gila River.

However, Lake San Carlos, backed up by Coolidge Dam, about 110 miles east of Phoenix, is holding about 31 per cent of capacity. This total is 577 per cent of average.

LAKES OF THE Salt River Project have been drawn down to about 90 per cent of capacity, to maintain control space.

With February through May runoff of 824,000 acre-feet forecast and the Salt River Project (SRP) holding about 210,000 or 10 per cent of its storage capacity open for control and management, Salt River Project said it is obvious that major additional releases down river will be necessary.

IF THE SPRING runoff comes late, however, or the thaws are gradual, it will be possible to use more of the flow of the streams for irrigation or other uses. Valley of the Sun lands that use irrigation water almost continuously throughout the year will be drawing down some of the present storage for irrigation and electric power generation throughout the spring crop-watering months. Thus the storage capacity will be used and reused. The SRP water management program will, of course, try for holding the maximum stored water near the end of the spring runoff—meantime using open capacity for leveling off flood waters as much as possible.

Although January snow surveys revealed far below average water content for the month, snow cover is well above average from December storms, said Richard Euz, snow supervisor for soil conservation service.

THE HEAVIEST snow pack in Arizona is on the Gila River watershed, two and one-half times average, or 250 per cent. On Salt River drainage, the water content of the snow cover is 158 per cent of average, on the Verde 119 per cent. The snow cover is about the same as 1952 and 1960, but not as high as in 1962.

Lake Pleasant of the Beardley project is full on Agua Fria River. Lyman Lake on Little Colorado River is expected to fill. Show Low Lake is full.

1721167
Ariz. Rep.

Reservoirs Easily Able to Handle Runoff Waters

A tremendous tide of runoff water has gushed into major Arizona reservoirs during the past week, but there still is room for plenty more.

This was the consensus yesterday of officials who, nevertheless, continued to maintain a leary 24-hour watch on streams feeding the reservoirs.

LATE YESTERDAY, the Salt River Project's six lakes, with a total storage capacity of 2,072,050 acre-feet, had a combined unfilled capacity to handle 653,395 additional acre-feet.

The principal streams feeding those lakes, whose flows reached a peak early Tuesday night, continued to wane throughout yesterday.

Heaviest flow was in the Verde River which at 8 p.m. Tuesday hit a peak of 32,800 cubic feet per second. By 4 p.m. yesterday the Verde flow declined to 2,000 cubic feet per second. Similar slow-downs were measured on the Salt River and on Tonto Creek.

APPROXIMATE acre-foot capacities still remaining in the individual Salt River Project lakes were: Horseshoe 108,000; Bartlett 120,000, (both on the Verde); Roosevelt 411,000; Apache 6,300; Canyon 4,700, and Saguaro 6,200, (all on the Salt).

Total inflow gained by the lakes during the 24-hour period that began at 2 p.m. Tuesday was 3,251 acre-feet.

Storm runoff last night was still being released into the Salt River channel from Granite Reef Dam at the rate of 530 cubic feet per second.

THIS RUNOFF, as well as other runoff which was channeled into New River and Skunk Creek, came from local rainfall and did not represent a release of water stored in the reservoirs.

Elsewhere, authorities at Coolidge Dam reported a 20,784 acre-foot increase in stored water over the same 24-hour period in San Carlos Reservoir. This, however, was a mere drop in the bucket for the San Carlos, which has a 1,285,000

(Continued on Page 18, Col. 2)

Flood Aids Ground-Water Supply, Engineer Reveals

It helps the ground water supply by putting water in the usually dry river beds . . .

That's one of the conclusions reached by R. A. Rukkila, a water engineer with the U.S. Geological Survey in Phoenix.

Rukkila's study of the ground-water situation in the Salt River Valley shows a lot of good came out of what some people called a flood nearly two years ago.

THAT'S THE time when wa-

ter was running bank to bank in the Salt River, crossings were washed out and cars were lined up for miles as they inched their way across the Tempe Bridge.

Rukkila's study is detailed on the latest report on "Ground Water In Arizona."

His findings include:

● **IN MANY** parts of the Valley, water levels in wells increased during the year between spring 1965 and spring 1966.

● In the Phoenix - Glendale-Tolleson- Deer Valley area, the average rise was 5.6 feet.

● Water - level rises were greatest in wells adjacent to the Salt River, where rises of up to 37 feet were measured.

● **RISES OF** from 5 to 20 feet were measured in the New River - Skunk Creek basins, while increases of up to 25 feet were recorded near Higley.

● Water-level rises in wells near the Salt River indicated recharge occurred to the clay, silt and sand underlying the river.

The Valley's underground water picture wasn't all bright, however. Rukkila also found:

● **A MAXIMUM** water-level decline of 25 feet in a well in the lower Centennial area.

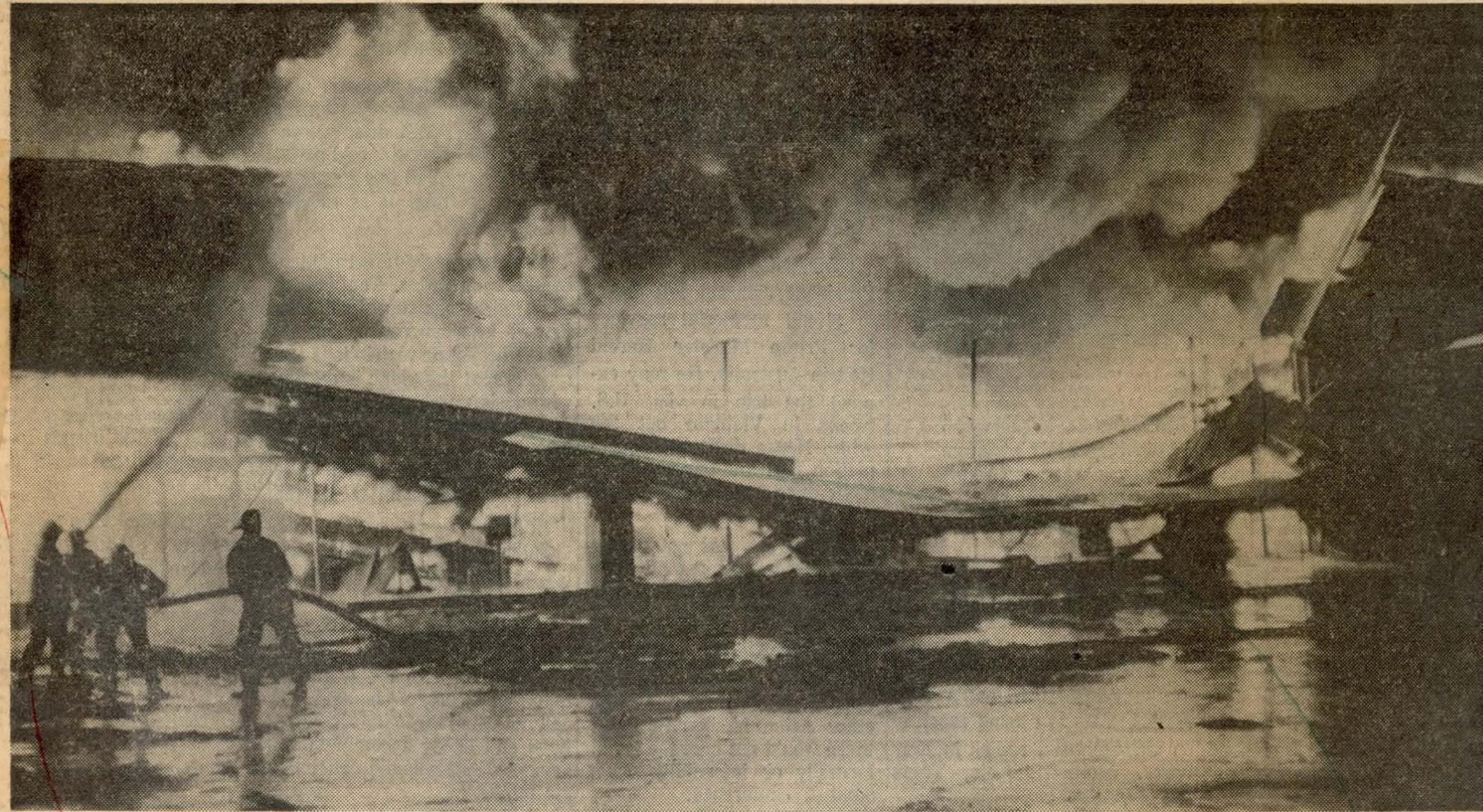
● **Substantial declines** occurred in the heavily pumped Litchfield - Buckeye-Beardsley-Marquette area in the northern

part of the Liberty - Buckeye-Hassayampa area, and in the outlying Santan Mountain area south of Magma.

PUKKILA said depths to water in the Valley in spring 1966 ranged from 15 feet below the land surface near Queen Creek northeast of Florence Junction to 493 feet near Cave Creek.

The state - wide report was prepared under the direction of E. B. Hodges of the U.S. Geological Survey, who points out that the "mining" (use) of the ground water "must be controlled by proper management in order to conserve, and where possible, supplement the supplies."

Flooding, More Snow Possible



AP Wirephoto

Firemen battle blaze started when F4D jet fighter-bomber crashed into Tucson supermarket during rush hour.

BULLETIN

Winds with gusts up to 50 miles an hour were forecast for this afternoon in the Phoenix metropolitan area by the U.S. Weather Bureau. Also forecast were brief thunderstorms and locally heavy showers.

Warnings came from the weatherman and from lawmakers today as a wintry storm continued to lambaste Arizona.

The weatherman warned of the danger of flooding in some areas and of the possibility of still more snow at higher locations.

The storm was blamed for the death of Clarence R. Bickford, 63, of Montrose, Colo., who died of carbon monoxide poisoning after his car stalled in snow 13 miles north of Flagstaff.

His wife, Helen, 61, and daughter, Jewell Anne, 19, were reported in satisfactory condition in a Flagstaff Hospital. The three were on their way to a Christmas family reunion at the home of a daughter, Mrs. Lennea Tobin, in Buckeye.

A HIGHWAY rescue crew found the three in the car, its motor still running, yesterday afternoon. Bickford died on the way to a hospital in a snowcat.

The storm was listed as a contributing cause of the death of Kenneth E. Prince, 22, formerly of Buckeye. An employ of the Arizona Highway Department, he was killed yesterday when a heavy metal scoop fell on him while on a highway-clearing job.

The accident took place at the Flying V Maintenance Camp about 35 miles northeast

pai, told his colleagues that, unless equipment is sent to help the snowbound people, "there won't be any taxpayers left up there."

Sen. E. H. Thode, D-Pinal, a ranch owner who has a cattle operation in Apache County, said many ranchers will be paying 1967 taxes on cattle carcasses if assistance isn't given immediately.

Yesterday, Governor Williams joined with the govern-

Additional Stories On Page 14

ors of Utah, Colorado and New Mexico in calling upon the federal government to declare disaster areas those part of the four states badly stricken by the storm. No reply had been received at noon today by Williams' office.

YAVAPAI County's Board of Supervisors already have declared an emergency situation exists in that county. Leaves and days off for many county employes were canceled.

Bill Beers, the county's Civil Defense director, said snow was over 2 feet deep in some parts of Prescott and a rain this morning was creating a big runoff that could result in flooding.

When the skies clear sufficiently, the Yavapai sheriff's office was to use a helicopter to attempt to reach a family isolated in the Constellation area northeast of Wickenburg.

DURING THE night, Flagstaff got just what it didn't need—7 more inches of snow. That brought the total on the ground to 66 inches—just two under the record depth recorded in 1949.

The snow was more than 72 inches deep at Hawley Lake. The depth at Maverick is anybody's guess. The logging camp high in the White Mountains is abandoned and nobody's around to measure the snow in the place that formerly figured so prominently in Arizona weather history.

Payson had 48 inches of snow on the ground last night,

Turn to STATE, Page 4

● STATE WARNED

Concluded From Page One

but it melted down to 28 before morning. Alpine has 47 and Show Low 29. Grand Canyon reported 14 inches. Prescott airport's snow level has dropped to 12 inches.

SNOW STILL was falling in Flagstaff, among other places, late this morning and the weatherman said the end isn't in sight.

There is indication the snow in higher elevations and the rain in the lower valleys may start to decrease tomorrow.

This is the seventh consecutive day with measurable precipitation in Phoenix and in a greater part of the state.

PHOENIX Sky Harbor has recorded 3.01 inches of precipitation during the storm, raising the total since Jan. 1 to 7.37 inches. That's .17 more than is normally received during an entire year.

The Federal Aviation Administration's flight service station at Sky Harbor reported airports at Flagstaff, Prescott and Show Low are closed. Other landing fields in the northern area were operating under marginal conditions. Pilots reported gusting winds up to 68 miles an hour and icing conditions in the north.

For Sky Harbor there was no interruption of service today for commercial carriers.

A marked warming of the air below the 6,000-foot level was noted over the state during the night and Phoenix was no exception.

The mercury started climbing at Sky Harbor in the evening and moved from 47 degrees at 8 o'clock to 51 at 11 o'clock and then to 53 at midnight.

THAT WAS the first time since Dec. 12 that the day's high has been above 50.

The hourly reading remained at 53 until it dropped to 51 at 5 a.m. but it was up

to 54 at 6 a.m. and by 9 a.m. the reading was 56.

In Prescott the mercury "froze." Yesterday's high was the same as this morning's low—37 degrees.

THE WEATHERMAN expected a cold front to move across the state today. He said it would lessen melting of snow and a change in precipitation from rain to snow at the 3,500-foot level.

Reports from over the state included:

Prescott—Emergency equipment from the U.S. Forest Service was used in preparing meals for patients at Prescott Community Hospital after the weight of snow damaged the roof over the hospital's kitchen and cafeteria. Jail trustees were to sweep away the snow today.

JEROME — Electric service has been restored, one lane of the highway has been cleared of snow and several families have been evacuated. Buildings in the once-prosperous mining town are being watched for possible sliding.

Globe-Miami — Municipal governments in these "twin cities" do not own a snow plow, but they do have some heavy-duty road graders. However, for awhile this equipment could not be used in removing snow from the streets because no chains were available.

Globe — Postmaster Lamar Brewton appealed to patrons to come to the post office and claim their mail. He said many have stayed away so long their individual boxes are full and overflowing.

FREE WATER AND SPRING RUNOFF OUTLOOK HEARTEN FARMERS OF SALT RIVER VALLEY

FREE WATER for any Salt River Project farmer that can use it! Such was the glorious news broadcast on Dec. 20, immediately after subsidence of the eight-day storm that was one of the most extraordinary, and for many people was the most disastrous, in Arizona's history.

A surprising number of farmers could use free water, not to be counted against their regular allotments, even though their fields were already saturated by four inches of rain or more.

But keeping the Project system in shape to deliver water was no simple chore. It required the attention, and hard labor of scores of men around the clock for three days and nights.

The canals were practically dry when the storm began, and there was no particular threat until a warm rain resumed after a day's suspension. This was on Dec. 16. Cave Creek, on the north, was soon a raging torrent menacing the Arizona Canal. On both sides of Salt River there were plenty of danger points.

So a dozen crews were called into action by Henry Shipley, assistant general manager for operation and maintenance, and Bob Moore, irrigation superintendent. They patrolled the canals, checked every turnout structure, watched every wash and every flooded road.

Constant Vigilance

At the control center, near Project headquarters across Salt River from Tempe, operators wearing telephone headsets were constantly pouring data into computers. Hourly report sheets were made up, enumerating volume of water reaching the different reservoirs contents of each reservoir; how much of a head each canal was carrying; the story told by half a hundred stream gages.

A similar situation existed a-straddle New Year's day of 1965, and similar precautions were taken. But Shipley says that this time the information was even more accurate and complete, and interpreted more rapidly. For one thing, more gages and more telephone or radio connections have been provided. In Salt River Canyon, northeast of Globe, there is now a gage and the operator of a service station keeps close tabs as a part-time Project employee.

it was not necessary to release one drop from any reservoir. There was enough high water down the Salt below Granite Reef to cause some damage in Phoenix, and a number of public roads were closed for several days. All this, however, came from local precipitation, not from Project storage. The canals carried off much that could have raised highway and property damage by many thousands of dollars.

Briefly it looked as though the Verde might fill both the Bartlett and Horseshoe reservoirs, for its flow reached a peak of 36,000 second feet. This, however, subsided to 3,000 cfs as soon as the rain stopped and temperatures dropped. That high flow came mainly from rain-melted snow. Reservoir gains for any 24-hour period were never more than a little over 3,000 acre-feet.

On Dec. 20 the Verde lakes were still able to accommodate 228,000 acre-feet and unfilled storage on the

Salt amounted to 425,000 feet. Only reservoir anywhere near full was the very lowest one on the Salt, Saguaro, which could take 6,200 feet and no more.

As the storm faded, Cave Creek continued to pour water into the Arizona Canal, and Sycamore Creek into the Verde above Fort McDowell. So the word was flashed to all shareholders that free water was waiting for anyone who spoke for it. Not much response was expected, but somebody guessed wrong.

"We were astonished by the free-water orders that poured in," Shipley says.

Drowning The Bollworms

Biggest users were cotton growers who had their fields plowed to comply with pink bollworm regulations. The more water in such plowed soil, the more overwintering worms will die either from rotting of their cocoons or from simple melting. And

there is hardly any limit to the water that alfalfa can use, provided only that it is within reach of roots that reach to China or beyond. Some decided to give their just-sprouted grain or safflower an extra soaking. Others knew that it would be weeks before fallow ground would be dry enough to plow, so they decided to store as much moisture in the soil as possible.

At this writing, free water is still being delivered to hundreds of farms. Shipley says that as Cave Creek and Sycamore recede, withdrawals will be made from Saguaro Lake. He seemed to think that the free-water offer could be continued for two or three weeks without reducing the stored supply for next summer's heavy irrigation season.

Prospects for spring runoff could scarcely be brighter. The Mazatzals and Four Peaks are capped with snow. Around Flagstaff the snow is seven feet deep, and a blanket four to five feet thick lies over much of the high country. Few exact measurements are yet possible but it is certain that there is already more snow on the watershed than normally falls in a whole year. If spring weather conditions are right, those reservoirs just could fill.

—AFR—

The greatest trouble that workers had along the canals was moss. The sudden influx of water dislodged huge quantities of algae, commonly called moss, which piled up at every structure and impeded flow. If scores of such accumulations had not been promptly raked out, there might have been scores of canal breaks.

As it turned out, there was not one break. Cave Creek did spill over into the Arizona Canal, northwest of Phoenix, but it did not cut through the lower bank. Aside from washed-out roads here and there, no damage was suffered by Project facilities.

Flood Hazards Lessened

There was plenty of empty storage capacity behind the dams on the Salt and Verde. Still, a sudden intensification of the storm anywhere on the watershed could have caused some of the dams to spill and create flood hazards downstream. As it tured out,

The amount of salt to include in poultry rations will vary according to the amount of natural salt found in the feed. Ingredients of animal origin are rich in natural salt; grains and other feed of vegetable origin are low in salt.

SNOW DEEP

Feb. 1, 1968

Pho. Gazette

Runoff Assures Full Reservoirs

Snow - water surveys on Verde and Salt river watersheds today virtually assure full reservoirs for Salt River Project with spring runoff.

Along the Mogollon Rim on Verde drainage, Baker Butte above Pine jumped its snow-held moisture by 3½ inches to a total of 19-plus from the weekend storm.

RICHARD ENZ, snow survey chief of U.S. Soil and Water Conservation Service, said deep snow covers the Rim sector — 53 inches at Baker Butte and a heavy cover all along through the Heber sector.

The White Mountain area on Salt River drainage gained slightly at significant stations from the weekend storm, particularly at the higher elevations, Mount Baldy and Maverick Fork, but the storm dropped less moisture there than on the Verde side.

There are 18.9 inches of water content in the snow on San Francisco Peaks inner basin, up four inches from two weeks ago, for Flagstaff city water supplies. New snow is two feet deep on top of the old snow pack.

MOUNT BALDY in White Mountains has an even foot of water content in its snow pack for the runoff that will not be finished until in May or June.

Maverick Fork has 14 inches of water in its snowpack. Each of these snow courses is up an inch in water content. There was a drop in water content at Beaver Head and Nutrioso. Hannegan Meadows on Coronado Trail has 16.6 inches of water in its snow cover.

The snow line generally is around 6,000-foot elevation. The significant stations below 7,000 on the Salt lost a little in water still stored in snow during the last two weeks.

IN THE MORMON Lake area on Verde drainage, Mormon Mountain snow courses have snow depths of 39 inches, holding 12.5 inches of water, off two from the mid-January readings of the snow survey crews and their associated private and governmental agencies. Newman Park, near Munds Park in this area, has 23 inches of snow cover and water content up almost an inch at 8.9 inches.

2/19/68

□ The Phoenix Gazette

Water Release Possible

It may be necessary to release about 175,000 acre-feet of water down the Salt River channel below Granite Reef Dam to make space available for the spring runoff, Salt River Project officials said today.

The water would be released

in small amounts between now and June 1.

Project officials, who began a temporary dryup of the river channel this morning, said a late survey shows 825,000 acre feet of water is in the snow on the watersheds. Of this, 420,000 can be delivered to users and 230,000 is needed to fill the reservoirs.

Esmer-Ranchman

Nary A Saltcedar Back Of Coolidge Dam After Mid-'69

³⁻²⁻⁶⁸
ONE MORE YEAR (fiscal) and the reservoir basin behind Coolidge Dam will be clear of phreatophytes.

It looks as though the goal can be obtained by the target date of July 1, 1969, says Richard C. Culler, in general charge of this joint effort of the U.S. Geological Survey and Bureau of Indian Affairs.

Originally, saltcedars in particular, plus a few minor water-wasting plants, had occupied 8,000 acres along the Gila that will all be under water if the reservoir is ever filled to capacity. Now, 5,000 acres have been cleared. What jungle acreage remains can be disposed of in 1968-69.

When this project began, Coolidge Lake was at a very low stage. In 1965 it gained considerably in volume and that drowned out many acres of saltcedars. Now it is rising again as a result of the December storm, and there can be still more substantial increases from spring runoff. So there may be considerably less than 3,000 acres left for clearing.

Asked to estimate how much water this will save for farmers of the 100,000-acre San Carlos Irrigation District, in Pinal County, Culler shook his head and replied that he'd be afraid to guess. It is a fact, however, that a 100% stand of saltcedars can use seven acre-feet a year. So the saving can conceivably be several thousand times seven.

— AFR —

PHREATOPHYTES *continued*

are essential as shade for livestock and homesteads, even in places where water is scarce. Many persons have been interested in the possibility that phreatophytes in large valleys may keep sediment from getting into storage reservoirs. But whether holding the sediment out of the main part of the reservoir outweighs the water they use is questionable. However, few studies have directly demonstrated how much water could be saved by the removal and replacement of phreatophytes. Various assertions have been made as to the value to wildlife and cattle of phreatophytes growing in river bottoms. The most objectionable phreatophytes spread fast and cover large areas with dense thickets that may or may not provide food and protection for wildlife. Many estimates of water use by phreatophytes have been made for individual areas. It may not be practical or desirable to recover all of the water because the vegetation using it gives some protection against erosion.

Although many plants are classified as phreatophytes, only about 8 or 10 appear to be a real or potential problem. The phreatophyte composition of any given river basin is dependent upon depth of ground water and on salinity and climate. Some of these phreatophytes are widespread throughout the entire West, and others, such as saltcedar, are confined to the river valleys of the Southwest. In all, they waste tremendous quantities of ground water each year. The consumptive waste is emphasized when expressed in terms of man's needs. The water used by a square mile, 640 acres, of cottonwood would supply the water needs of a city of nearly 23,500 people, while the water used by one square mile of saltcedar would supply the water needs of a city of 28,300 people.

Many persons believe that the high consumption of limited water supplies by phreatophytes is one of the most serious problems facing the irrigated West. It is estimated that phreatophytes (excluding beneficial



Figure 2 — Aerial photograph of the western edge of the Granite Reef Experimental Area showing the islands of tamarisk and seepwillow in the center and upper-part of the picture. This, like many other phreatophyte infested areas, represents tremendous losses of water each year. (Photo by Donald Dockins)

species such as alfalfa) cover about 16 million acres in the 17 Western States and discharge as much as 25 million acre-feet of water into the atmosphere annually. To recover the water, the vegetation must be taken from it. Removal of the vegetation by mechanical means, burning, chemical sprays, or other methods is only temporary if other conditions are unchanged. Permanent control can be achieved only when the water is removed from the plants by lowering the water table, piping the water across the infected area, or cutting off the supply from upstream. Some studies have been made of the potential savings of water from the eradication of phreatophytes. The consumption of water by non-beneficial phreatophytes in Nevada was estimated at 1,500,000 acre-feet a year. About 25% of that amount, or 375,000 acre-feet, was estimated to be salvageable — enough to irrigate 133,000 acres of alfalfa. Another example is the proposed channelization of the Gila River past Phoenix. The Corps of Engineers and the Geological Survey estimated that keeping a floodway 2,000 feet wide and 77 miles long free of phreatophytes would save an average of 16,000 acre-feet of water annually. (See Figure 2)

The population increases in the dry Western USA have produced shortages of water, and, consequently, the need of studies to increase water supplies. Even though only a few species are trouble makers, in the interest of conserving water to meet an ever-growing demand and to reduce flood hazards in the Southwest, more and more attention must be given to the phreatophyte problem. Although little has been done so far to prevent the consumptive waste of these miniature pumping plants, much of the water undoubtedly can be salvaged by converting consumptive waste to consumptive use.

March 1968

Phreatophyte

FRIEND OR FOE

by Dennis Cole, Senior Engineering Student, ASU

Water — “the limiting factor” — is scarce in many parts of the United States, especially the American Southwest. States are wrangling all the way to the U. S. Supreme Court for just a little of the water of the Colorado River. But twice the annual flow is being wasted by Phreatophytes.

Phreatophytes are plants that depend upon ground water that lies within reach of their roots. They form a definite group of plants but do not belong to any specific family. Their common characteristic is that during the growing season they satisfy their water needs by drawing on the ground-water reservoir, somewhat like a pump. The word phreatophyte means “well plant.” About 75 plants are now considered phreatophytes. These range in size from grasses to large trees, and include crop plants (alfalfa). Although not confined to the arid regions of the Western United States, their occurrence is more common, more spectacular, and, because of their effect on water supply more important there, than it is in humid and subhumid regions. Most phreatophytes have low economic value, and consequently the water they use and return to the atmosphere without substantial benefit to man is defined as consumptive waste.

Men who have studied the problem throughout the West realize that a large part of the water consumed by phreatophytes could be put to beneficial use by replacing the phreatophytes with crops, grasses, or other beneficial vegetation. They make a distinction



Figure 1 — Sycamores growing along Sycamore Creek near Sunflower, Arizona — pretty but wasting water. (USDA photo F-502603)

between phreatophytes that are directly beneficial to man and those that waste water. Alfalfa, a plant that uses more water than most crops, is esteemed. Trees use large amounts of water (see Figure 1), but some
(Continued page 10)

Arizona Professional Engineer

State Water Supply Outlook Good, Snow Samples Show

The 1973 water supply outlook for Arizona is "very good," according to the results of snow samples just released by the U.S. Soil Conservation Service.

The SCS takes snow samples at the same locations and on the same dates each year from January 1 through April 1. Forecasts, they say, tend to be more accurate later in the season as early readings must assume average snowfall for the next several months.

Based on these early readings, however, the SCS predicted above average flow on all streams this spring, above average water supplies through the year and good

carry - over average water supplies through the year and good carry - over storage likely in the larger reservoirs.

Conditions revealed by the latest survey include:

- Snow cover. The present snow cover is above average on all watersheds, ranging from above average on the Gila to almost three times average on the Verde.

The Salt Watershed is 52 per cent above average and the Little Colorado Watershed 41 per cent above average. Heaviest snow accumulation is along the Rim between Williams and Heber.

More than five feet of snow was recorded on the San Francisco Peaks — the deepest ever measured there this early in the season. A recent storm since the last week's measurements has increased the snow cover even more.

- Precipitation. October precipitation was extremely high, the SCS said, with many stations exceeding their all time records for any month. More than 15 inches was recorded at several stations along the Rim.

These heavy rains produced high runoff from all watersheds, the report indicates, increasing reservoir storage substantially and filling soil profiles to capacity.

November and December precipitation continued above normal, resulting in the present heavy snow cover. The several light storms so far in January have not contributed large amounts of water to the snow pack, but have kept it from decreasing.

- Soil moisture. The October storms saturated soils on all watersheds and soils are still very wet, the report said, ranging from between field capacity and saturation.

Heavy runoff will result from melting snows and moderate subsequent precipitation, it added.

- Reservoir storage. The report said all major reservoirs contain above average amounts of water for this

The Salt River Project reservoirs presently contain 71 per cent of capacity which is 47 per cent above average. Storage at San Carlos Reservoir is 450 per cent above average at 42 per cent of capacity.

- Streamflow and water supply. The report indicated rivers continue to flow much above average due to the fall and winter storms.

The Salt and Verde system is expected to produce more than 500,000 acre - feet between now and May if precipitation is near normal.

The San Carlos Project has also benefited greatly from the fall and winter runoff and although above average runoff is expected to continue there through May, the extent will depend on further storm activity.

Scottsdale Progress 1-3-73

Greater county funding needed for flood control

If citizens of Maricopa County continue to contribute to flood control funds at the present rate it could take at least 48 years to provide adequate flood control protection for Scottsdale and the rest of the Valley.

This statement was made today by Maj. Will Worthington of the U.S. Corps of Engineers as he outlined flood control needs to a special task

force formed by the Phoenix Metropolitan Chamber of Commerces.

Major Worthington explained that slightly more than \$500,000 now is being collected through the Maricopa County Flood Control District with a five-cent levy on each \$100 of property evaluation.

"We need about \$24 million of local participation to get the

job done," Worthington said. "Simple arithmetic shows that at the present rate of collection, without even thinking about inflation, it would take 48 years to get the flood protection needed here in Maricopa County."

Public Works Director Marc Stragier and J. Stephen Simon, local attorney, represented Scottsdale at the task force meeting where members were told the federal government is ready and willing to supply \$123 million in project funding if the citizens of Maricopa County can come up with \$24 million for purchase of rights-of-way before actual construction.

Both Stragier and Worthington estimated it would take another \$40 million in local funds to provide backup projects necessary for over-all protection from flooding.

Stragier represented the Maricopa Association of Governments and Simon the Scottsdale Chamber of Commerce at the meeting.

Garth Fuquay of the Corps of Engineers' Los Angeles District Office said "The projects here now have the highest priority in the Los Angeles District," Fuquay said. "I'm here to make every attempt to speed things up."

Randy Scoville, task force chairman, said he is sending letters to officials of both public and private agencies to gather ideas on how the flood control projects can be expedited.

Stragier said the MAG Committee had at first thought that a "pay-as-you-go" method of financing the projects would be best, but that the group has changed its view and decided that a county-wide bond issue is needed before the programs can be assured of any kind of success.

At today's meeting, Major Worthington filled task force members in on the Corps plan of improvement for flood protection.

Scottsdale Progress 1-3-73

Snowpack heavy, Salt could flood

Flood control experts are crossing their fingers that a warm rain won't cause flooding of the Salt River that would cut the Valley in half for weeks as it did in the winter of 1965-66.

They claim that an unusually heavy amount of snow is packed in the water sheds above the Verde and Salt Rivers. Main concern is over the Verde watershed whose two lakes are near capacity.

Dick Enz of the U.S. Soil Conservation Service said the snow cover is piled four feet and higher in elevations around the 10,000-foot level. He said it varies from 20 to 30 inches around Flagstaff and points north.

He said the 20-inch snow pack along the higher reaches of the Verde River are well above average and could cause a substantial run-off in case of a warm rain.

Last week the Salt River Project was forced to shorten its dry-up of the Arizona Canal to one week, from the usual four-week period, because of the abnormal amount of runoff

from the watersheds.

Last year on this date there was a total of 992,433 acre feet of water stored in the lakes while this year that total has risen to 1,376,090 acre feet.

The six lakes on the two rivers, except for Roosevelt Lake, are averaging within 5,000 acre feet of their capacities. Roosevelt, the largest, is slightly more than half filled.

Apprehension too was voiced today as members of the Metropolitan Chamber of Commerces met to discuss expediting of flood control measures for all parts of the county.

"If a warm rain came tomorrow we probably would suffer greater losses from flooding than in the flood of 1965," one official said. "All we can do is cross our fingers and hope the rains don't come — but I do think that residents should be warned of the possibilities."

Ted Wilson of SRP, was a little more conservative, claiming that if the warm rains come there would be just a little more runoff than was experienced last week.

Water could flow in Salt River — then, again...

Water could flow in the normally dry Salt River this spring, cutting off Scottsdale from areas south of the river.

And again, it might not, Salt River Project spokesmen said today.

That "iffy" prediction was based on the latest snow survey by the U.S. Soil Conservation Survey in the watershed areas of the Salt and Verde Rivers north and east of the Valley.

Last month the SRP indicated that heavy snowfall probably would result in overflowing of Horseshoe and Bartlett Lakes, resulting in release of water from those reservoirs. That water eventually would flow into the Salt between Scottsdale and Tempe, blocking all but the Tempe Bridge crossing and

possibly the Country Club Drive crossing into Mesa.

Later, however, the Salt River Project's board was told that gradual thawing of the snow pack on the watersheds would permit water to be used from Bartlett and Horseshoe as quickly as it flowed into them from the north.

There has been little said concerning the capacity of the four lakes — Saguaro, Canyon, Apache and Roosevelt — on the Salt River where there is room for an additional 475,000 acre feet of water.

The latest snow survey, which followed two heavy storms, again indicates, however, that sudden runoff caused by unexpected warming or rain could fill Verde reservoirs and force

releases of water in the Salt River channel.

Results of the latest U.S. Soil Conservation Snow Survey taken Feb. 15 show an average of 8.1 inches of water in snow on the 13,000 square-mile watershed in the Salt and Verde rivers.

SRP runoff predictions, based on possible precipitation include:

Below normal precipitation — 210,000 acre feet inflow in the Salt system; 125,000 into the Verde system, 335,000 total.

Normal precipitation — 323,000 acre feet into the Salt system, 65,000 into the Verde system, 488,000 total.

Above normal — 460,000 acre feet into the Salt system, 250,000 into the Verde, 710,000 total.

Runoff into the Salt River reservoirs is expected to be close to the projected storage. There is room for about 475,000 acre-feet in addition to water already stored, or 15,000 more than the maximum 460,000 expected.

The situation on the Verde River watershed is more serious because those reservoirs have room for only 25,000 more acre-feet of water, where up to 250,000 acre-feet is expected, Project spokesmen said.

Water use will be a key to avoiding forced releases, and the SRP plans to continue drawing most water orders from Verde reservoirs in an attempt to outpace expected inflows, spokesmen said.

Water has been released into the channel four times since last summer.

Scottsdale Progress 2/20/73

Scotts. Project 3/19

Salt River to flow at least a month

Salt River Valley residents can expect water to flow down the riverbed in varying amounts for at least another month and possibly longer.

That was the forecast given today at a news conference called by the Salt River Project and various governmental agencies.

This spring's greatest runoff from melting snow on the SRP's watershed is expected within the next 30 days, but unless it is hit with a heavy rainstorm on top of the snow pack, no major flooding is expected.

Richard Enz, hydrologist with the U.S. Soil Conservation Service, said his latest survey indicates an average of 13.8 inches of water on the Verde River watershed and 13 inches on the Salt River watershed.

Water in the four-to-seven feet of snow on the Verde system is three times the average for this time of year and water in the three-to-10 feet of snow on the Salt watershed is twice the average, Enz said.

He said that the heavy runoff does not pose an imminent threat of major river flooding unless a heavy storm dumps large amounts of water on the packed snow.

"The danger is not the snow," Enz said, "but rather how much rain the watershed gets."

The Salt River Project, Soil Conservation Service and National Weather Service officials outlined the present

runoff situation and the anticipated water flows in the normally dry Salt River bed.

Enz said the snow runoff from now through May will be 460,000 acre feet into the Salt River reservoirs and 200,000 acre feet into the Verde reservoirs.

Reid Teeple, SRP assistant general manager for water, said that an unfilled capacity of 20,000 acre feet (af) of water would be maintained in the Verde River lakes and 125,000 af in lakes on the Salt River.

He added that the resultant releases from the reservoirs into the Salt River bed should not exceed 10,000 cubic feet per second. The flow will continue for at least a month, and possibly longer, he said.

Water was running in the bed this morning at a rate of 13,000 feet per second, Teeple said, but that can be expected to decrease within the next two or three days. He said the peak flow already has been reached.

Teeple said that when the waters do begin to recede, some of the flooded Salt River crossings could be reopened.

Most Salt River crossings, including Scottsdale and Hayden Roads and Country Club Drive, now are closed. Three remain open, including the Mill Avenue Bridge in Tempe.

Robert Ingram, chief meteorologist at the Phoenix office of the National Weather Service, said that there has been no break in the current pattern of storms which have been moving down from the Gulf of Alaska along the California coastline and eventually blowing into Arizona.

But he added that April usually is the driest month.

If weather is normal, the snow pack should melt gradually and cause no problems, he said. However, he said a serious flood condition may occur if an extended warm rain should fall on the snowpack before it has had time to melt off safely.

The officials emphasized that a continual air and ground surveillance is being kept on the watershed to insure that a sudden runoff won't catch the Project by surprise.



Flooding

—From Page 1

avenue bridge is open to river crossing traffic on the east side of the Valley, officials said.

Of the 14,000 cfs being released, an estimated 8,000 cfs is being released from the Salt system with another 6,000 cfs coming into the river from the Verde system. The entire SRP system has only 160,072 acre feet of room left in their seven lakes, the SRP added, explaining why they are releasing water from both systems.

A 30 day forecast given by the Weather Service saw several new storm systems on the way, but Ingram said it was too early to tell if they would be warm systems that could bring rain to melt the snow on the water shed.

The Daily News

TEMPE, ARIZONA, MONDAY, MARCH 19, 1973

607 Mill Avenue

No Large Releases Expected

Flooding Seen Thru

By BOB MULLER

Salt River Project officials announced today at a Phoenix press conference, that an estimated 170,000 acre feet of water will have to be released into the river bottom from now until May, with a possibility that many unbridged river crossings would be closed until then.

The SRP, playing a numbers game because of the unknown future weather factor, said they have 160,000 acre feet of room left in all the lakes and expect customer use to equal 330,000 acre feet through May. They

estimated 660,000 acre feet of water to melt on the water shed, leaving the 170,000 excess amount which could rise if more rain falls or a rapid snow melt takes place before customer use can absorb the water.

Bob Ingram, of the National Weather Service, said assuming we get normal precipitation and normal temperatures, he expects a safe runoff. This runoff would be enough, however, to keep many roads closed, he added.

"Should warm rains fall on the snow pack before it has had time to melt off

safely, serious problems could arise on some watersheds," Ingram said.

Dick Enz, of the U.S. Soil Conservation Service, said the snow pack on the Verde and Salt systems was "two or three times greater than the average."

He said he expects much of the runoff to occur within the next 30 days, also agreeing that he did not expect the snow to melt fast.

Enz said he fears more rain than he does the melting snow, as the saturated watersheds could not ab-

sorb anymore and this rain would help to melt the snow.

Enz added he feels there is percent chance to equal the 6 cubic feet per second flow of the flood when even the freeway had closed to traffic.

All the estimations by the SRP Enz are based on normal weather patterns, with most observers agreeing this has not been an average year.

SRP officials said they are trying to maintain 20,000 acre feet of room on the Verde and 125,000 acre feet

Page 2

State

PHOENIX (AP) — A man is searching today for a youth who escaped last night.

A fifth youth, 17-year-old, returned by his parents.

The other four youth are in Phoenix; 17-year-old Jeff Morrison is in Phoenix.

Authorities say they are looking for keys.

They used the keys to open a window, and escaped.

PHOENIX (AP) — A man completed a nine-day search for a snow bound Indian reservation.

State Aviation officials are investigating the case.

He said supplies were heavy snows that

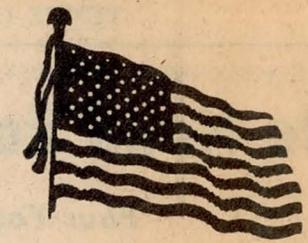
PHOENIX (AP) — A man was to be charged with charges of violating

The 61-year-old man faces up to five years in prison.

Valenti was named by the Federal Grand Jury. He was charged with

DISTRICT
COUNTRY
V. DURANGO
X
85009

Tempe Daily News



es TEMPE, ARIZONA, MONDAY, MARCH 19, 1973

607 Mill Avenue

86th Year—No. 67

No Large Releases Expected

Flooding Seen Thru May

By BOB MULLER

Salt River Project officials announced today at a Phoenix press conference, that an estimated 170,000 acre feet of water will have to be released into the river bottom from now until May, with a possibility that many unbridged river crossings would be closed until then.

The SRP, playing a numbers game because of the unknown future weather factor, said they have 160,000 acre feet of room left in all the lakes and expect customer use to equal 330,000 acre feet through May. They

estimated 660,000 acre feet of water to melt on the water shed, leaving the 170,000 excess amount which could rise if more rain falls or a rapid snow melt takes place before customer use can absorb the water.

Bob Ingram, of the National Weather Service, said assuming we get normal precipitation and normal temperatures, he expects a safe runoff. This runoff would be enough, however, to keep many roads closed, he added.

"Should warm rains fall on the snow pack before it has had time to melt off

safely, serious problems could arise on some watersheds," Ingram said.

Dick Enz, of the U.S. Soil Conservation Service, said the snow pack on the Verde and Salt systems was "two or three times greater than the average."

He said he expects much of the runoff to occur within the next 30 days, also agreeing that he did not expect the snow to melt fast.

Enz said he fears more rain than he does the melting snow, as the saturated watersheds could not ab-

sorb anymore and this rain would also help to melt the snow.

Enz added he feels there is a 10 percent chance to equal the 60,000 cubic feet per second flow of the 1965 flood when even the freeway had to be closed to traffic.

All the estimations by the SRP and Enz are based on normal weather patterns, with most observers agreeing this has not been an average year.

SRP officials said they are trying to maintain 20,000 acre feet of room in the Verde and 125,000 acre feet of

room in the Salt system to cut the top off of the future peak flows. This cutting of peak flows will mean the Valley will get a steady run of water instead of a great amount at one time which could destroy river bottom businesses and roads.

Water is now coming down the Salt River at 14,000 cubic feet per second, with a cutback seen within the week. This cutback could open some of the roads that have small bridges covering the channel. Only the Tempe bridge, the freeway and the Central

Turn to Page 5

Flagstaff snow hits 174 inches, tops '49 mark

A heavily snow-laden storm spread across Arizona yesterday, breaking a 24-year record for winter snowfall in the Flagstaff area.

Paul Sorenson of the National Weather Service at Flagstaff Airport said the snowfall since Oct. 1 has been 174 inches, surpassing the 167 inches recorded in 1949. The airport had 11 inches of new snow yesterday.

The weather service said nearly a foot of new snow can be expected by this morning in areas along the Mogollon Rim, the White Mountains and in areas of southeastern Arizona. The snow level is expected to drop to 3,000 feet.

Flagstaff city officials said the snowfall greatly improved the water outlook for the coming year, but created extensive water and snow damage to roads.

Dick Williams, assistant city manager, said that \$500,000 in repair work was a conservative estimate for initial damage reports. He added, however, that the extent of damage cannot be fully assessed until streets have dried.

The heavy precipitation on the Salt River Project watershed compelled the SRP to continue its release of water into the normally dry Salt River.

The Phoenix Police Department reported the following roads open over the Salt River: Interstate 10, 49th, 24th, 16th

Continued on Page 4

MARICOPA COUNTY INFORMATION OFFICE
ROOM 604
111 SOUTH THIRD AVENUE
PHOENIX, ARIZONA 85003

More about

Flagstaff snow record

Continued from Page 1

and Seventh streets, Central and 19th avenues.

The Maricopa County sheriff's office reported the Tempe bridge was open as was one lane of traffic on Country Club Drive. Camelback was the only road closed across the Agua Fria River.

Meanwhile, the Maricopa County Board of Supervisors was told yesterday that pontoon bridges would not hold up as temporary spans across the river with the present rate of water flow, and that the cost of importing Bailey Bridges was prohibitive. Bailey Bridges are preconstructed, suspension-type bridges which span waterways.

In a briefing with Francis Lathrop, assistant county engineer, the supervisors were told that Capt. John Katin of the U.S. Army Corps of Engineers had toured county river crossings Wednesday and decided pontoon bridges were not feasible.

Katin told Lathrop that the present water flow in the river had reached a velocity of from eight to 12 feet per second and that the pontoons could be washed away. The pontoon bridges require a depth of at least three feet in which to float.

Col. John C. Lowry, chief engineer and general manager of the county flood control district, had earlier advised supervisors that the cost of Bailey Bridges could approach at least \$250,000 each.

Lowry said the bridges, which can carry only one lane of traffic, are available at Army installations in St. Louis or in Marion, Ohio.

In formal action yesterday, the supervisors called for bids for construction of an unlined pilot channel in the Salt River near Tempe to provide for construc-

tion of a bridge over the river bed at Scottsdale Road.

The temporary access bridge presently in place east of Scottsdale Road across the Salt River could be repaired and in use by the weekend if the flow of water into the riverbed does not increase, county officials said.

Scottsdale *Daily* Progress

YOUR AWARD WINNING HOMETOWN NEWSPAPER

Vol. XIII, No. 20

SCOTTSDALE, ARIZONA, SATURDAY, MARCH 24, 1973

10c Per Copy

Valley has sun again but river cuts roads

Sunny skies and warmer weather moved into the area today and brought smiles to the faces of Valley residents who have suffered under the recent rash of winter storms.

But motorists who face trips across the Salt River weren't particularly happy to find that river crossing on the east side of the Valley once again is limited to the Mill Avenue Bridge in Tempe.

Country Club Drive and Scottsdale Road were open Friday but closed again today as the Salt River Project increased the release of water into the river bed. A Project spokesman said the flow was expected to hit 13,000 cubic feet per second this afternoon as the sun melted the recent snow in the high country. The Project is releasing the water in an attempt to maintain about 100,000 acre-feet of available storage space in the four Salt River lakes and about 20,000 acre-feet of space in the Salt River lakes.

The National Weather Service today predicted that the mercury would climb into

the upper 60s by this afternoon. Temperatures should be in the 40s tonight with a high in the lower 70s expected for Sunday. The sunny skies should prevail throughout the weekend.

The latest storm system has moved out of Arizona and was centered over Texas and Oklahoma today. Moist air remaining over the eastern section of the state could produce a few snow flurries in that area.

Flagstaff reported 31 inches of snow on the ground this morning, while the Grand Canyon checked in with 18 inches.

Crisp weather prevailed over most of the state Friday as the Phoenix high was only 58 degrees. The overnight low was 48 degrees. The high in Flagstaff Friday was a nippy 29 degrees. Only the southwestern portion of the state enjoyed seasonable weather Friday as Yuma recorded a high of 72 degrees.

Temperatures throughout the state were expected to be 10 to 20 degrees warmer today with additional warming forecast for Sunday.

Scottsdale Apr. 2, '73

Heavy river flow to continue week

Water will continue flowing in the Salt River bed through the Valley at or near its present rate of 21,000 cubic feet per second through at least this week, Reid Teeples, Salt River Project assistant manager for water, said today.

The flow is heavy enough to close all major crossings on the eastern side of the metropolitan area except for the Tempe and the Interstate bridges.

Teeples told the SRP Board of Governors meeting that the Project is attempting to maintain about 42,000 acre feet of space in the Verde reservoirs and about 100,000 acre feet on the Salt reservoirs.

He said that by doing so the Project anticipates that maximum release from the Granite Reef Diversion Dam will not have to exceed the present 21,000 cfs unless a major rain storm hits the Project's 8 million acre watershed.

If there was such a storm, Teeples warned, "anything could happen," hinting that run off would so exceed reservoir capacity and water use that major flooding could occur.

Teeples said that the Project hopes to gradually reduce the storage capacity in the reservoirs, filling them up as the spring progresses.

Latest survey of the watershed, Teeples said, shows an average 16.4 inches of water in the snow on the Verde watershed and 13.7 inches on the Salt. There was no snow on the watershed at this time last year, SRP reports show.

Teeples said inflows from the watershed into the Salt River reservoirs should amount to 410,000 acre feet through May and 225,000 acre feet into the Verde reservoirs during the same period.

He said that during April it's anticipated that 130,000 acre feet of water will be sent into the canal system while 230,000 acre feet will be released into the riverbed.

Water will therefore be running through the Valley through this month at gradually reducing amounts, Teeples said.

He said that during March the Project sent 360,000 acre feet of water flowing into the Salt River bed.

Mesa Tribune 4/6/73

Worst Flooding Ended

ST. LOUIS (AP) — The flood waters of the Mississippi River have hit an early and lower-than-predicted crest at St. Louis and officials said today it appears the worst of the flooding may be past.

"We're still sitting on a powder keg. The best hope is for only light rains. If we could get a week of no rain, we would be in good shape," said a National Weather Service spokesman.

"This isn't the end of the flood. It's still up there and is above flood stage. We won't get back to normal until the water gets back in the channel. You must also remember that we are in April and rain can be expected," he said.

The weather service said the river had crested at 39.84 feet

and dropped slightly by mid-morning today.

The weather service had forecast a crest of 40.5 feet for today, the highest level the river has reached at St. Louis since 1844. The forecast was revised Thursday to 40.3 feet, which still would have been a modern record, but the Mississippi never reached that level.

The U. S. Corps of Engineers said the lower crest would "not have any great immediate effect" on its damage estimate of \$41 million for the area from Hannibal, Mo., to Cairo, Ill.

The corps said that more than 1.2 million acres of land were under water from Hannibal to Cairo and nearly 4,000

persons have been forced to leave their homes. The death toll across southern Illinois and eastern Missouri stood at five.

Coast Guard reservists were called to active duty to assist in flood control Thursday. The activation of the reservists, authorized by President Nixon under a new law, was the first time ever that Coast Guard reservists have been called to duty during peacetime, a spokesman said.

Hundreds of Missouri National guardsmen have been on duty in flood areas since late last week.

A spokesman for the Corps said late Thursday the situation throughout the St. Louis district seemed to be improving.

Mesa Tribune
Watershed May 9
Runoff Peak 1973
Said Reached

PHOENIX (AP) — The U.S. Soil Conservation Service said spring runoff has reached its peak and water flows in the Salt River watershed will begin to recede.

By the end of the month, the service said about 2.5 million acre-feet of water will have flowed out of the Mogollon Rim and White Mountain ranges—the most since 1941.

All reservoirs in the Salt River project are full for the first time since 1968, and the San Carlos Reservoir on the Gila River near Coolidge is approaching record levels.

The service said snow below 7,000 feet has melted but there is still the greatest snowpack on record at the higher elevations of the Salt River watershed.

Snow 10 feet deep, containing four feet of water, was recorded recently above 11,000 feet on the San Francisco Peaks and Mount Ord.

Tighter limits on water usage planned

By Mike McCloy
The Phoenix Gazette

Phoenix has just one year to meet its water-conservation goal, and tighter state limits are coming.

So Water and Wastewater Department Director Bill Korbitz will go back to the City Council in the next few months with proposals for:

- Water cops to write \$10 tickets for people who insist on letting sprinklers and other water run in the streets.

- A water-rate increase for moderate and heavy users.

- Lawn watering restrictions for homeowners, perhaps on odd or even days, corresponding to house numbers.

There is no drought. Salt River Project's water supply is above average and the

Central Arizona Project will begin delivering billions of gallons of water to Phoenix in 1986.

But approval of the \$3.6 billion CAP was based on passage of the Arizona Groundwater Management Act in 1980, requiring the state to stop its 2-million-gallon annual overdraft of ground water.

So far, Phoenix has been able to cut consumption from 267 gallons per person daily in 1980 to 242 in 1984. But daily per-capita consumption jumped to 280 gallons this September.

The city must cut daily per-capita consumption by 6 percent — to 251 gallons — by Jan. 1, 1987, under the Phoenix Active Management Area's First Management Plan.

The second plan, effective in 1990, will have tougher conservation standards, Frank

Barrios, area director, said.

"We're going to look a lot closer at what the water uses in the cities are," he said. "We'll look at their system and the potential for various water-conservation techniques."

Korbitz had this in mind Oct. 22 when he suggested a \$220,000 annual enforcement program, with water-control agents writing tickets for waste. Their re-election just two weeks away, council members were not ready to listen.

"We'll try again to do that, no later than the spring of 1986," Korbitz said.

He also will ask the council to increase water rates for all except the poor and lowest-level users. "The people who waste water — those are the people who should pay the bills," Korbitz said.

And his proposal to limit lawn watering to odd or even days according to house number will include a restriction on daytime watering.

"We want to eliminate watering during the real hot evaporative times of the day," Korbitz said.

Golf-course operators will be asked to support a turf-management system, using weather stations throughout the Valley to determine when wind, temperature and humidity conditions are right for watering, Bill Mee, Phoenix water department planner, said.

Meanwhile, City Hall, Sky Harbor International Airport and parks have cut water use to head off any finger-pointing by the public, Korbitz said.

See • Water, B-2

● Water

From B-1

If Phoenix residents think they've got it bad, they can ponder Prescott where there is not enough water to flush a roadside restroom, or Israel where 4.5 million people share a single 18-hole golf course.

The solution at the Hell's Canyon Rest Area on U.S. 89 about 36 miles north of Prescott is a compost toilet made in Sweden.

Instead of using water and a septic system, it makes compost that is dumped in a landfill.

"We've probably got \$35,000 in it," George Christiansen, Prescott area engineer for the highway department, said. "It's probably the most expensive privy in the state, but drilling a well would cost \$50,000."

Such measures are routine for the Israelis, who use 1.2 million acre-feet (325,800 gallons to an acre-foot) of water a year, compared with 2 million acre-feet used by the Valley's 1.5 million people, Sol Resnick, University of Arizona water researcher, said.

"Nothing gets out to the Mediterranean Sea," Resnick said, describing a system of lined tanks and canals, drip-irrigation systems and allocation of water among agriculture, industry and cities in Israel.

"You don't find a glass of water on the table in the restaurants," he added. "Even what comes down the sewer line is carefully controlled."

But the Israelis take time for flowers.

In greenhouses stretching for miles along the Mediterranean they circulate sea water in a double-plastic roof that acts as a condenser.

"They add fertilizer and grow flowers for the European market," Resnick said. "They're delivered fresh daily but they haven't used one drop of fresh water. Sun powers the whole system."

Using one-third surface water, mostly from the Jordan River, and two-thirds ground water, Israel operates "right at safe yield," balancing pumping with recharge, he said.

Conservation efforts won't wash

City officials are drafting plans to dam up water waste in Phoenix. Under the provisions of the Arizona Groundwater Management Act of 1980, daily per-capita consumption must sink 6 percent — to 251 gallons — by Jan. 1, 1987.

Among the proposals being floated by Water and Wastewater Department Director Bill Korbitz is one for "water control agents." These ominous sounding individuals would slap water-wasters — the folk who water the streets after yards have reached saturation — with a ticket and a \$10 fine.

Although Korbitz's intentions are admirable — the drain on precious groundwater must be slowed — city residents will be more likely to flow with conservation efforts when they see more evidence

that the city is plugging its own wasteful usage.

Broken sprinklers in the underpasses of the Black Canyon Freeway, for example, regularly water shrubbery, pavement and passing autos. City parks are often watered even while it's raining.

City Councilman Duane Pell described the depth of the city's problem at a council meeting when he observed that the city receives thousands of complaints about water waste each month. "Let's clean up our own house before we go out in the street with water cops," Pell said.

Pell is correct. Until the city is able to demonstrate that it has a better handle on its own faucets, Valley residents may be inclined to tell the City Council to dry up.

Supervisors asked to foot water-recharge bill

By Mike McCloy
The Phoenix Gazette

George Campbell, chairman of the Maricopa County Board of Supervisors, had breakfast with Valley water leaders today and may end up paying a \$5 million tab.

The \$5 million is needed from taxpayers to recharge 100,000 acre-feet of Colorado River water into the ground, members of the Save Arizona's Future Economy committee said.

That's enough water to supply 500,000 people for a year. It is flowing down the Colorado River to California and Mexico because Central Arizona Project customers are unable to use it or store it underground, the committee was told.

"We can recharge 100,000 acre-feet now," Bill Chase, water adviser to Phoenix, said. "If we could resolve the problem of \$5 million a year, all the other problems could be solved. I think the Maricopa County Flood Control District is the ideal vehicle."

Campbell was surprised but supportive.

"We've never been asked about this," he said. "If we can come up with a basic plan, we have the ability to fund, if we can be convinced that it's economically viable."

Campbell promised to meet "as soon as possible" with officials of major cities, the Phoenix Active Management Area, Salt River Project, Central Arizona Project and Agri-business Council of Arizona.

Legislation is pending in the state House to allow the flood control district to help recharge surplus water into the ground as long as the operation is incidental to a flood control project.

That measure could be expanded to allow full-scale recharge projects similar to those in California, SAFE committee members said.

"If we don't take our 1.5 million

acre-feet out of the river and recharge it this next year, California is going to take it," Karl Kohlhoff, Mesa water adviser, said.

The \$3.6 billion Central Arizona Project will deliver about 490,000 acre-feet of the 1.5 million acre-feet

of Colorado River water available this year to the Central Arizona Water Conservation District in Maricopa, Pinal and Pima counties, district spokesman Jim McIntyre said.

Farms, factories and cities on the CAP will not be ready to take their

full allocation until the project is completed to Tucson in 1991.

Until then, unused CAP water should be recharged to stem Arizona's estimated 2.5 million acre-foot annual overdraft of ground water, the SAFE committee believes.

Editorials

These are the views of The Phoenix Gazette as an institution, thus are not signed by an individual writer.

Some lakes actually conserve water

As Arizona's population increases, there will be less water per person, even when the Central Arizona Project is completed, and if its proposed storage dams are constructed. This is why *The Gazette* has agreed in principle with Senate Bill 1377, which would restrict ornamental lakes in developments.

At present there are more than 2,000 acres of such lakes planned, under construction or completed. The bill would prohibit any type of water, except treated effluent to fill lakes, ponds, lagoons or swimming pools larger than olympic size in the state's active water management areas. The idea is good — to keep drinking water from being wasted to make a development more attractive.

One of the main problems with ornamental bodies of water is one of perception. Arizonans and newcomers alike tend to regard any body of fresh water as potable. The fountain at Fountain Hills development northeast of Scottsdale is frequently cited as an intolerable waste of water. The fountain, however, uses mostly high quality effluent.

Lakes and lagoons are glittering attractions in a development, and it is possible to create these with an actual savings of potable water. A showcase example is

Western Savings' Leisure World development in east Mesa. This development, begun in 1972, has its own sewage treatment plant, which produces swimming-pool quality water for its lake.

This is mixed with non-potable water from nearby wells, which combats the buildup of heavy metals found in effluent. This creates a "living" lake that supports various aquatic life, including fish which eat mosquito larvae and algae. Too, the lake catches storm runoff to prevent flooding in the area. A lake filled only with effluent is "dead" because of the heavy-metals buildup.

This development has a "two-pipe" water system, using the recycled waste from homes, the drain water and the non-potable well water for fire protection and irrigation. Waste water from homes is recycled and put back into the lake continuously.

So drinking water is saved through reuse of waste water, a practice that ought to be encouraged by state law. The Leisure World lake would not be permitted under SB 1377, however, because it does not use effluent exclusively.

If a lake works to save water, it should be allowed, and even marked with a distinctive symbol identifying it as a water conservation lake.

Restrictions on pools larger than olympic size should be dropped from the bill. These are economic necessities for large resorts, but it's doubtful that even three more will be built in the Valley, and the amount of water is relatively small.

The fact remains, however, that if a would-be developer plans to keep a lake filled indefinitely with drinking quality water — the case with most of the lakes now — no lake development should take place. Only lakes that save drinking water should be allowed.

5-23-86
Az Republic

Valley Could Sustain Growth If Conservation Practiced

J. J. Casserly

Editorial Writer
The Arizona Republic



(Second of four columns)

Several million more residents and much more industry could be served in the Valley if:

- The state's high rate of water waste, including evaporation, were significantly curtailed.
- Use of Central Arizona Project water were maximized.
- Wastewater were put to its highest and best use.

Perhaps 500,000 acre-feet of water, involved in servicing the

Valley, evaporates each year — from the Colorado River, Central Arizona Project canals, local dams and elsewhere.

That total is what the CAP is bringing in, so evaporation effectively results in a trade-off.

One acre-foot services a family of five for a year, enough for 2.5 million more people. Not all water could be saved, but if residents and industry could conserve one acre-foot each year per acre, the Phoenix area would actually increase its groundwater levels. These have long been diminishing.

That is the conclusion of Charles B. Hinkley, a Valley water resources consultant.

The continuous annual overdraft of 2.5 million acre-feet by Arizonans has been one of the

state's most severe problems.

By reducing areas of open water here, Hinkley says, the area can save about six acre-feet of evaporated water annually per acre.

Every farm that is retired can save almost six acre-feet of water per year for every acre.

More water can be saved by converting to crops which offer high yield using drip irrigation.

All this has vast potential for water conservation since agriculture uses more than 80 percent of the state's resource, much of that groundwater.

It would be wise, long-term public policy to convert more farms to growing crops that need little water. Some would require marketing promotion, but there is now a demand for new vegetables

and processed foods that were virtually unknown to the public only a few years ago.

Hinkley says that concentrating on available markets for low-irrigation crops and developing new markets for existing desert plants could reduce farm water use. However, this would have to be consistent with economic return.

Government at all levels can help growers through grants, low-cost loans or subsidies to convert to drip irrigation where feasible. Such irrigation reduces the need for fertilizers and herbicides. That would cut groundwater contamination, and decreased evaporation would mean less salts.

In the same conservation mode, all open bodies of water should be justified for their usefulness —

irrigation reservoirs; flood-control basins; retention basins for water runoff; reservations to permit irrigation of large areas at night, and tertiary processing of wastewater through use of aquatic plants.

Other areas offer savings. Almost 2,000 acres of man-made lakes dot the Phoenix area. Hinkley says water loss from evaporation on these lakes could supply a city of 60,000 people for a year.

Swimming pools should be covered when not in use to save millions of gallons in evaporation every day. Golf courses could be converted to native grasses needing little water.

Water-saving devices should be mandated in all homes. Desert landscaping should be required of

all residences and other buildings.

Surplus reservoir and CAP water should be diverted directly to recharging groundwater. That includes the hundreds of thousands of acre-feet now flowing but not captured in the Colorado River.

Some 1,700 miles of canals and laterals in the Valley lose much water through evaporation. Highways can be constructed over main canals. Using them as throughways can reduce the need for freeways, lower right-of-way costs and provide a water cover to reduce evaporation.

Overall, the cost of water should be raised to help conserve it and help pay for planning and programs to increase supply.

(Next: Wastewater)

County to Study Need of Water Supply Zone

Re-establishment of a special water replenishment zone in the county's west basin will be studied soon by M. E. Salisbury, County Flood Control District chief engineer.

The zone was established in 1954 and will expire July 1, 1964, unless re-established.

The West Basin Water Assn. advocates its continuance and the Board of Supervisors ordered the study.

Supervisors Burton W. Chace and Kenneth Hahn said the zone includes a small part of Los Angeles and all or part of El Segundo, Manhattan Beach, Inglewood, Hermosa Beach, Redondo Beach, Hawthorne, Lawndale, Torrance, Gardena, Rolling Hills, Rolling Hills Estates, Palos Verdes Estates and some unincorporated territory.

A 5-cent tax per \$100

assessed valuation is levied in these areas to finance the water conservation program to benefit the communities named.

The county still depends upon its underground supplies for more than half its daily water needs.

The replenishment program funds are used to buy imported water for the West Basin barrier program, for construction of the West Coast Basin Barrier Project to help further brine intrusion of fresh water supplies along the coast and to investigate reclamation of waste waters at the Hyperion outfall plant.

Indian Bend Wash

TCE 'no major problem'

By MARK FLATTEN
Progress Staff Writer

High levels of a suspected carcinogen in the Indian Bend Wash should not pose a major problem when the city establishes groundwater recharge facilities there, Scottsdale's water advisor said today.

Although the presence of the industrial solvent trichloroethylene (TCE) will complicate efforts to charge underground water tables artificially, it should neither prevent recharging nor significantly affect the cost, said Leonard Dueker, executive assistant to the city manager.

"It is something that when we get into designing the recharge operations, we will take into consideration," Dueker said. "If we are recharging and recovering the

water, we would design the two (processes) in such a manner that we would move the TCE to towers where we could clear it."

TCE, once commonly used by electronics companies, has been found in wells owned by Scottsdale, Phoenix and the Salt River Project generally in the area between McKellips and Indian School roads, and between Miller and Granite Reef roads.

Levels range from 5.7 parts per billion to 1,100 parts per billion. A level in water considered safe for drinking is 5 parts per billion.

Last week legislation was signed by Gov. Bruce Babbitt that makes it practical to recharge groundwater artificially by allowing recovery of water that has been put into underground aquifers for storage.

Scottsdale was the leading backer

of the law, and Dueker said the wash is the city's prime site for recharge facilities.

Recharging is the process of returning water to underground aquifers either by pumping it or allowing it to percolate down through ponds.

Underground water that has high TCE content can be isolated and moved, Dueker said.

For instance, the city could pump water out of the ground near McKellips Road and recharge it near Indian School. That would move the contaminated water south toward McKellips, he said.

When the city begins recharging water, it will attempt to isolate and concentrate the contaminated water into a certain area.

When the water in that area is used, it will be pumped through an aeration tower similar to one in

operation near 82nd Street and Osborn Road.

TCE evaporates when it comes into contact with the atmosphere. The \$3 million tower has brought water from the well at 82nd Street to safe levels, Dueker said.

He acknowledged that recharging water in the wash would in effect be mixing good water with contaminated water. But he added that pumping it through aeration towers would clean the TCE to safe levels.

By the time the water reached the customer it would be clear of dangerous TCE concentrations, Dueker said.

The U.S. Environmental Protection Agency is studying contamination levels in the wash in an attempt to identify the cause and help determine which clean-up efforts would be the most effective.