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P. 288

# ADDENDUMS



# **ADDENDUM I) RESTORATION AND MONITORING PRACTICE FACT SHEETS\***



**NRCS conservation practice name, code, and expected lifespan:** Diversion (similar to Net Wire Diversion) (362) or Terrace (open ended) (600) (Life span 10 years, (USDA NRCS)). (Note that this is not a grade stabilization structure (410) because it is designed to be porous and specifically not designed to be a dam, which is required to contain a minimum flow event without overtopping the embankment).

**Common practice title:** Contour Stone Lines or Bunds, Water spreading stone bunds, Sloping bench terraces

**Application:** Surface runoff water management, soil conservation, and erosion mitigation measures in the flatter upland flow areas that have access for stone delivery. On slopes >5% (bund) or for water harvesting on slightly sloping plains (< 5%) in semi-arid regions. For steeper slopes (up to 60%), contour forward sloping bench terraces are constructed or developed over time from vegetative strips, contour earth bunds and stone bunds.

**Function:** To spread not impound water upstream before it enters arroyo flow, through increasing infiltration, recruiting vegetation, trapping soil and sediment behind structure, and increasing productivity for managed grazing.

**Technical description:** A stone line is typically 10' (25 cm) high and has a base width of 14"-16" (35-40 cm). It is constructed of a mixture of small and large stones along the contour and across a field. Smaller stones are placed upslope and the larger ones underneath to slow down runoff, trap fertile soil sediment and enhance water infiltration. The distance between the lines depends on the slope and how many stones are available. The recommended spacing between lines for



**Contour stone bunds on rangeland showing vegetation response and patterns (H.P. Liniger)**



**Detail of image above (H.P. Liniger)**

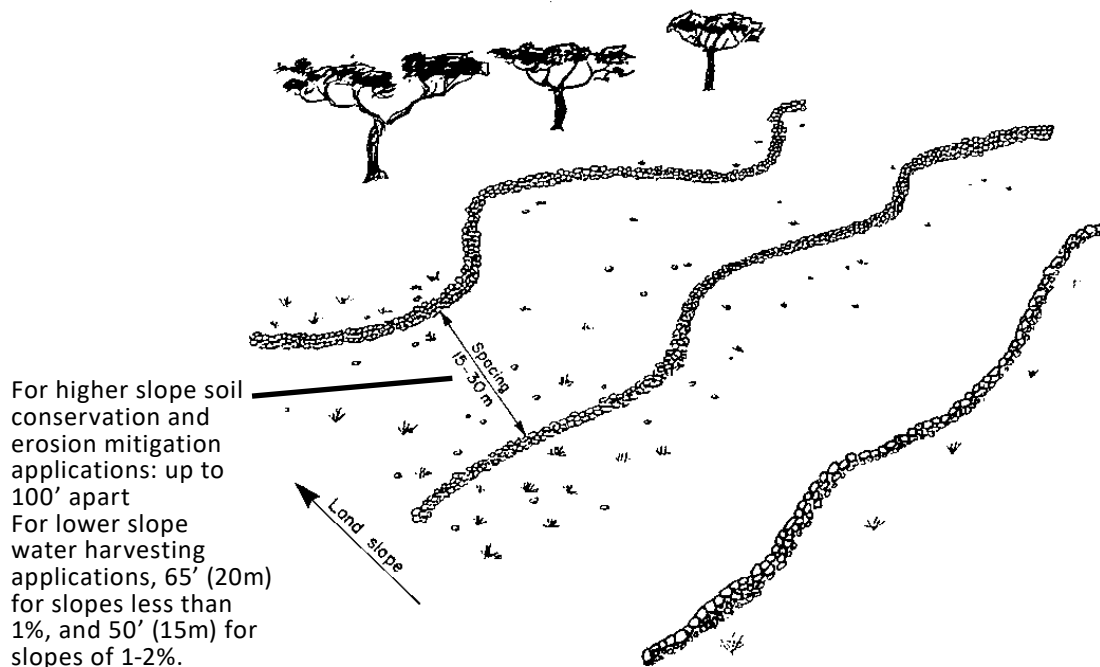


**Planted vegetation upstream of bund (BPD)**

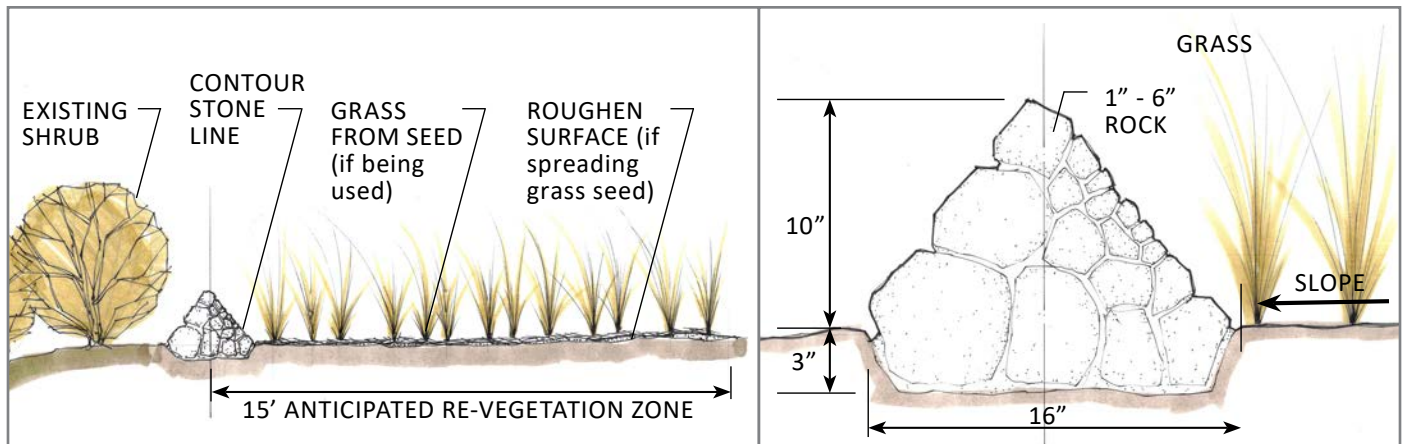
higher slopes is up to 100' apart, and for lower slopes, 65' (20m) for slopes less than 1%, and 50' (15m) for slopes of 1-2%. Sloping bench terrace technology combines soil and water conservation with water harvesting. Runoff is harvested from the sloping non cropped area between the terraces (C:A ratio 1:1 – 10:1). The arrangement of the stone lines is to encourage water spreading, and the configuration can "see-saw" or stair step, creating a longer path for the flow, as shown on page 3.

**Precedents:** Stone lines are common throughout the Southwest from CCC activity, and can be found throughout New Mexico and in the Rincon Arroyo watershed. Globally, they are common in Africa, in both dry and humid areas.

**Installation and staging:** Stone will be brought from an off-site quarry in a dump truck as marked on the plan. For the east subbasin, an existing UTV is anticipated to be used on the north side of the railroad. Gravel will be added to the path to stabilize the surface. Further transport may be by UTV as marked on the plan.



**Contour stone lines/bunds (Critchley and Reij 1989)**



**Section: Contour stone line with roughened and seeded strip for revegetation, by ALI**

**Stone bund (adapted from Critchley and Siegert, 1991 by ALI)**



Water spreading stone bunds (Ludi, 2019)

## References

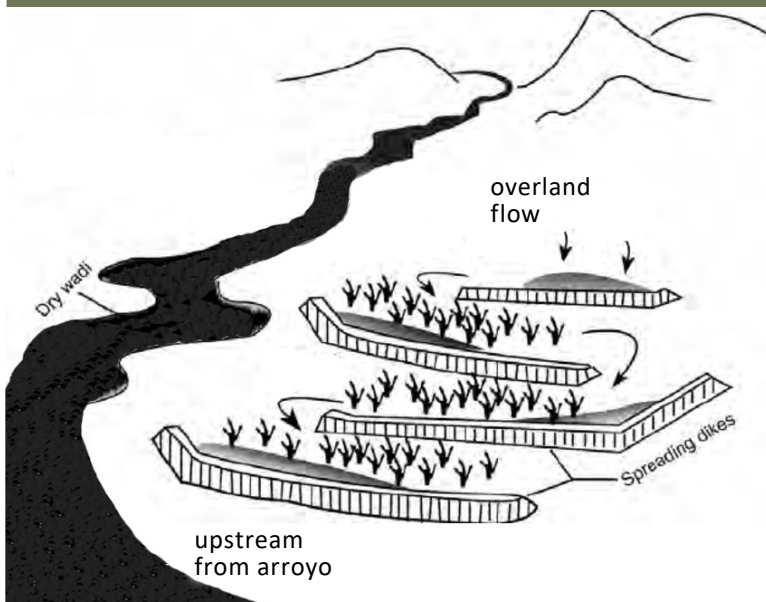
BDP, from: Biodiversity Policy Division, N. C. B., Ministry of the Environment of Japan. 2013. Lifestyles and Measures against Desertification. Biodiversity Policy Division, Nature Conservation Bureau, Ministry of the Environment of Japan: Tokyo, Japan.

Critchley and Reij 1989 and 1991, from: Critchley, W., K. Siegert, C. Chapman, and M. Finkel. 1991. Water harvesting. A manual for the design and construction of water harvesting schemes for plant production. <http://www.fao.org/3/u3160e/u3160e00.htm#Contents>.

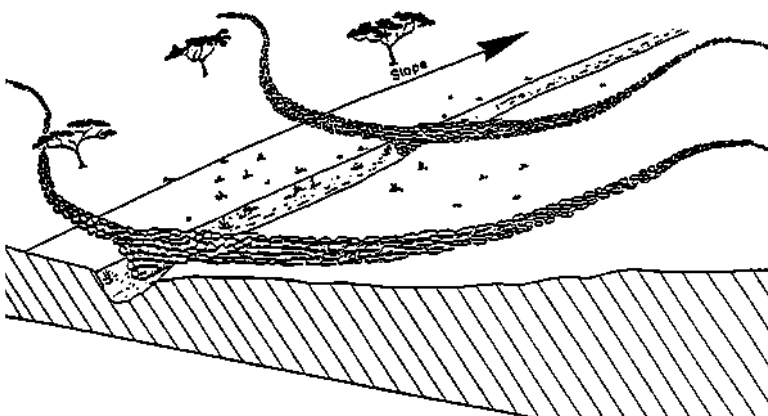
Ludi, E. 2019. WOCAT SLM Database: Stone bund. World Overview of Conservation Approaches and Technologies (WOCAT). [https://qcat.wocat.net/en/wocat/technologies/view/technologies\\_1389/](https://qcat.wocat.net/en/wocat/technologies/view/technologies_1389/)

Mekdaschi Studer, R. and Liniger, H. 2013. Water Harvesting: Guidelines to Good Practice. Centre for Development and Environment (CDE), Bern; Rainwater Harvesting Implementation Network (RAIN), Amsterdam; MetaMeta, Wageningen; The International Fund for Agricultural Development (IFAD), Rome.

Rango, A., and K. Havstad. 2011. Review of Water-Harvesting Techniques to Benefit Forage Growth and Livestock on Arid and Semiarid Rangelands. *Water Conservation*:1.



Adapted from Rango and Havstad, 2011 (after Prinz & Malik, 2002, as adapted from French & Hussain, 1964)



Permeable contour stone lines through arroyo. Critchley et al. 1991.

## floodwater harvesting and energy mitigation: low impact restoration technologies

**Common practice titles:** Keyline Plowing, Imprinting, and Seeding; the Keyline system; Keylining; Keyline Plowing

**Description:** In the mid 1950s, Australian engineer P.A. Yeomans demonstrated a new system of land management he called the Keyline system.

**Application:** A one-pass method developed by High Desert Native Plants LLC and collaborating partners to apply three land treatments with one pass of a machine rig.

**Function:** Landscape-scale application of Keyline Plowing, Imprinting and Seeding in an effort to reduce soil loss and erosion.

**Technical description:** The Keyline Plow used in this project has (3) 22-inch shanks spaced at 24-inch centers equipped with a hitch that tows a 6-foot wide imprinter with seed hopper. The keyline plow shanks engage the ground, slicing open 22" deep grooves in the soil without turning over the soil, allowing air and water to penetrate new depths. The imprinter rolls the land, creating millions of water-harvesting divots in the surface. Imprints hold water that normally would run-off barren soils. The Seed hopper distributes seed before the imprinter rolls the ground.

Mulch will also be applied by collecting cut biomass from the site and processing it with mulcher and applying before or after the KIS treatment. Mulch will be spread with a mulch spreader.

### References

HDNP et al., 2022. All Keyline Plowing, Imprinting descriptions and photos provided by High Desert Native Plants, Gordon Tooley, *Tooley's Trees and Keyline Design*, and aeries provided by Esha Chiocchio Photography <https://www.eshaphoto.com/>.

Yeomans, Percival Alfred. 1954. 'The Keyline plan', The Keyline plan.

## practice fact sheet: KIS (p.1 of 2) *keyline plowing, imprinting, and seeding*



**The imprinter rolls the land, creating water-harvesting divots in the surface (HDNP et. al, 2022)**



**Treated land after a good year of rain (HDNP et al., 2022)**



**Imprinted land seen at different scales in the landscape (HDNP et al., 2022)**



The tractor with Keyline Plow, Imprinter, and Seeder (HDNP et al., 2022)



Mulch will be spread with a mulch spreader (HDNP et al., 2022)



Details of the Keyline Plow, Imprinter, and Seeder (HDNP et al., 2022)



Detail of seed hopper (HDNP et al., 2022)



The Seed hopper distributes seed before the imprinter rolls the ground (HDNP et al., 2022)



The keyline plow shanks (HDNP et al., 2022)

**NRCS conservation practice name and code:** Net Wire Diversion / Diversion (362) (Life span 10 years, (USDA NRCS)).

**Common practice title:** Brush weir, Contour Wire and / or Brush Line, Net wire diversion

**Application:** Surface runoff water management, soil conservation, and erosion mitigation measures in the flatter upland flow areas. The practice objective is to control or protect range land from gully and/or sheet erosion, and head cuts caused by with excess volume or energy by diverting it to protected areas, spreading and/or reducing the velocity of flow.

**Function:** Surface runoff water control and management to spread not impound water, through increasing infiltration, recruiting vegetation, trapping soil and sediment behind structure, and increasing productivity for managed grazing.

**Technical description - see sketch on following page:** A low profile 10'-12" galvanized mesh wire with additional brush as a continuous horizontal porous obstruction to flow held by posts 10' maximum on center. Brush is locally collected if available or brought to the site. The ground along the alignment of the Net Wire Diversion shall be gently smoothed and compacted as necessary. Shrubs shall be removed as required to install to construct diversion, but all vegetative disturbance shall be kept to a minimum. Grass shall not be removed other than that minimally necessary to construct diversion. The following requirements shall be met in the design of a net wire diversion: built to meet NRCS standards of a minimum 50 and ideal 100-year life-span.

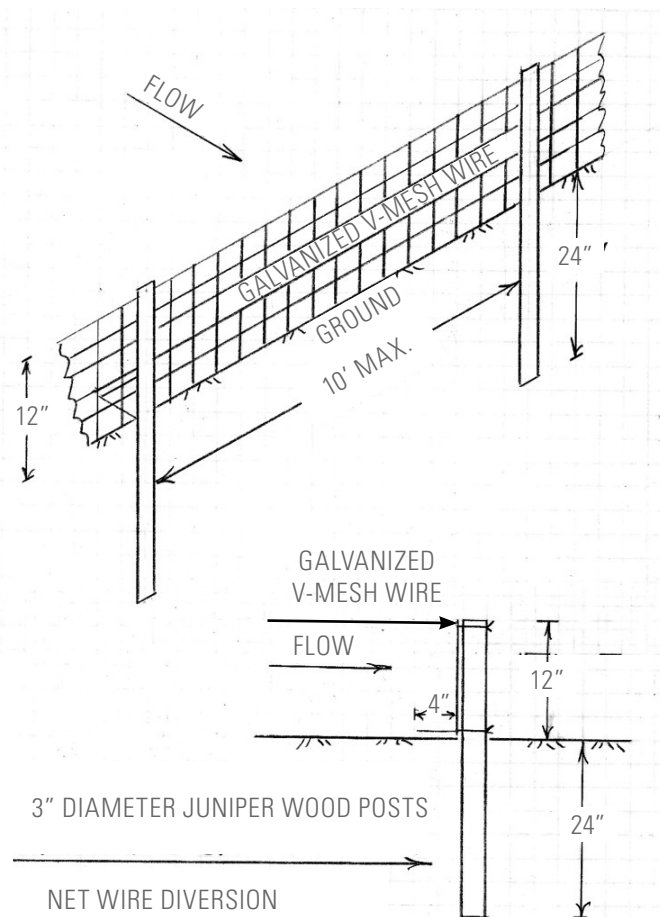
**Installation and staging:** Materials will be brought from off-site in a delivery truck as marked on the plan. Further transport may be by UTV as marked on the plan.



**Brush line, Pueblo of Isleta, upstream from Pottery Mound Site (Davidson, 2019)**



**Caruso, 2019: Net wire diversion. Quay County**



**Caruso, 2019: Net Wire Diversion sketch, with graphics and brush adaptations**

The diversion shall be constructed on the contour or on the planned grade of not more than .50 foot per 100 feet.

V-mesh wire fencing is sold in rolls of various widths (48-58"). These rolls can be cut in thirds making 495' out of one 165' roll. It is easier to cut the mesh while still in the roll. The V-mesh wire shall be placed on the upstream side of all posts and stays. V-mesh shall be secured at the top and bottom of each post and stay.

Posts shall be spaced at a maximum of 10' if intermediate stays are used and at a maximum spacing of 6' if stays are not used. Stays, if used, shall be placed at a maximum interval of 3.3'.

Main posts may be juniper with a minimum top diameter of 3", "T" or "U" section steel posts or iron pipe of not less than 1 1/2 inches inside diameter (Schedule 40). Intermediate posts (stays), if used, shall be common windmill sucker rod, 1" diameter steel pipe, or 3/4" diameter rebar. Intermediate stays will be set a minimum of 18" into the ground.

Standard nine gauge, 1 1/2 inch staples or 14 gauge galvanized tie wire may be used on wood posts, while galvanized tie wire shall be used to secure the net wire to all steel posts and stays.

Only galvanized, V-mesh net wire fencing, with a minimum of 12.5 gauge horizontal wires and 14 gauge vertical wires shall be used.

#### References, Image and Figure citations:

- Caruso, C. 2019. Basics of Upper Watershed Erosion Control. 2019 NMWDOC Annual Spring Conference and Workshop.
- Davidson, R. 2019. Brush weir figure.
- Gibbons, M. (2011). "SOIL | Wild and Woolly Weirs." 2019, from <https://ransomranch.org/2011/12/14/soil-wild-and-wooly-weirs/>.
- USDA NRCS. 2016. NRCS Field Office Technical Guide (FOTG) Arizona: Conservation Practice Standard Diversion Code 362. [https://efotg.sc.egov.usda.gov/references/public/AZ/161001\\_362\\_DiversionStandard.pdf](https://efotg.sc.egov.usda.gov/references/public/AZ/161001_362_DiversionStandard.pdf)
- USDA NRCS. 2013. NRCS Field Office Technical Guide (FOTG) New Mexico: Conservation Practice Standard Diversion Code 362.). NRCS Field Office Technical Guide (FOTG) New Mexico. [https://efotg.sc.egov.usda.gov/api/CPSFile/9677/362\\_NM\\_CPS\\_Diversion\\_2013](https://efotg.sc.egov.usda.gov/api/CPSFile/9677/362_NM_CPS_Diversion_2013)

**NRCS conservation practice name, code, and expected lifespan:** Diversion (similar to Net Wire Diversion) (362) or Terrace (open ended) (600) (Life span 10 years, (USDA NRCS)). (Note that this is not a grade stabilization structure (410) because it is designed to be porous and specifically not designed to be a dam, which is required to contain a minimum flow event without overtopping the embankment).

**Common practice titles:** microcatchments for water harvesting systems, including practices of small stone bunds, curved or semi-circular bunds, eyebrow stone bunds, small permeable stone and brush dams, eyebrow terraces, or small brush weirs.

**Application (for this project):** Microcatchment systems (Mekdaschi and Liniger, 2013) are structures placed on and maintain contours for surface runoff water management, soil conservation, and erosion mitigation measures for runoff from relatively small catchment areas (up to 2 acres). Areas for treatment are upstream from defined drainage areas (arroyos) that exhibit erosion and entrenchment. In this project, practices planned to be installed in the headwaters above arroyos are rock weirs (Maestas et al 2018)). The practice objective is to control or protect range land from gully and/or sheet erosion, and head cuts caused by excess runoff.

**Function:** Slow flow, capture sediment and nutrients to support revegetation and increased infiltration, and create shallow pooling that overbanks easily. Note that these are not dams and are not intended to impound water, but are porous catchments.



Eyebrow stone bunds on Alamosa Arboretum (ALI). Photo by: Connie Maxwell, 5/26/2008



Eyebrow stone bunds on Alamosa Arboretum (ALI). Photo by: Connie Maxwell, 8/31/2008

**Technical description:** Rock and brush weirs are small structures intended to slow flow in the upland rills above arroyos to create a low profile terracing effect. The structures are permeable, and overflow is intended to overtop the structures, requiring the height to remain shallow to prevent the flood flow from increasing energy through waterfalling, similar in function to a one-rock dam. The materials are to be commonly collected onsite if this does not compromise the site ecological integrity. Rock, including sizes between cobbles (2.5") and boulders (10"), and/or brush debris will be collected in a manner that does not compromise the site ecological integrity, no more than 25% will be moved from the surrounding areas to the practice location. The rock is placed on the surface on the contour, and are not commonly dug into the site, but if the surface is particularly uneven, a 3-4" deep trench may be created to form a level surface to create pooling. The rock spans the rill to maintain the contour of the rill bank. When using brush for headwater rills above arroyos, the approach of brush weirs is modified to be smaller and span the rill to maintain the contour of the rill bank. For a range of slope from 0% to 50% (1:2 gradient, 26.57°), the height range is from 8" - 1'-0" on the downslope side. The system is replicated with a similar design, with greater numbers of structures placed with greater apparent downstream erosion. Placement should be from 20'-60' apart of arroyo length, with the closer distance used more frequently, and the longer distances for areas with higher numbers of microcatchments to be placed, lower slopes, and more narrow, lower flow arroyos. For brush weirs, the posts will be (most likely) rebar or t-posts/u-posts (driven-in), or (less likely) wood posts (dug-in) depending on the conditions of the subsurface and the ability to install. The brush is placed onto the surface of the soil on the contour, and are not commonly dug into the site, but if the surface is particularly uneven, a 3-4" deep trench may be created to form a level surface to create pooling.

**Installation and staging:** The rock weir and media luna materials will be collected onsite. The brush weirs will be brought from off-site (pecan pruning material) in a delivery truck as marked on the plan. Further transport may be by UTV as marked on the plans.



Brush weirs (right Gibbons, M. 2011)

**NRCS conservation practice name, code, and expected lifespan:** Diversion (similar to Net Wire Diversion) (362) or Terrace (open ended) (600) (Life span 10 years, (USDA NRCS)). (Note that this is not a grade stabilization structure (410) because it is designed to be porous and specifically not designed to be a dam, which is required to contain a minimum flow event without overtopping the embankment).

**Common practice titles:** within the larger category of microcatchments, also called demi-lunes, and small permeable stone and brush dams

**Application (for this project):** As described by Maestas et al. (2018): The Media Luna (half-moon in Spanish) is a curving rock structure primarily used to manage overland sheet flow. While this type of structure can be created to collect and concentrate sheet flow (tips down; Sponholtz and Anderson 2013) they are most commonly used to spread sheet flow across a wider surface (tips up; Sponholtz and Anderson 2013) (Fig. 17, 18). (Maestas et al 2018)). This practice is also commonly used to capture surface runoff/sheet flow in agricultural applications.



A media luna in the borderlands spreads flow and becomes a trigger site for revegetation. Photo provided by Stream Dynamics and High Desert Native Plants (EES & SD, 2020)

**Technical description:**

- This structure type requires establishing accurate level grades with either a string level or a laser level because the tops of the rocks must be perfectly level for the structure to function properly.
- First layout and stake the contour where the structure is to be built, and then build the downstream row of rocks to match this level.
- Fit the rocks together as tightly as possible and utilize small gravel (or plants, sod) to fill gaps if possible.

The practice objective is to control or protect range land from gully and/or sheet erosion, and head cuts caused by excess runoff. This practice is also commonly used to capture surface runoff/sheet flow in agricultural applications.

**Function:** Slow flow, capture sediment and nutrients to support revegetation and increased infiltration, and spread or maintain spread flow by maintaining a relatively consistent top surface on the contour.

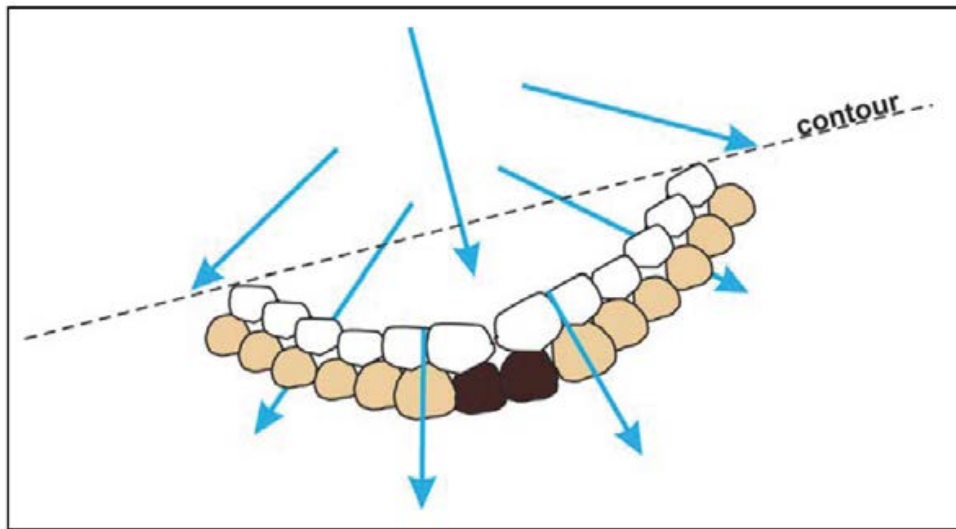


Figure 17. The media luna with the structure tips pointed upvalley helps evenly spread out overland flow. Figure from Zeedyk et al. (2014)

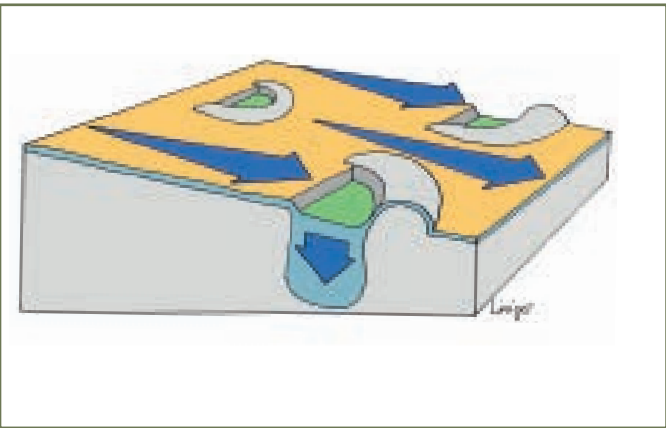


**Media Luna**

Media-lunas (Maestes et al., 2018)



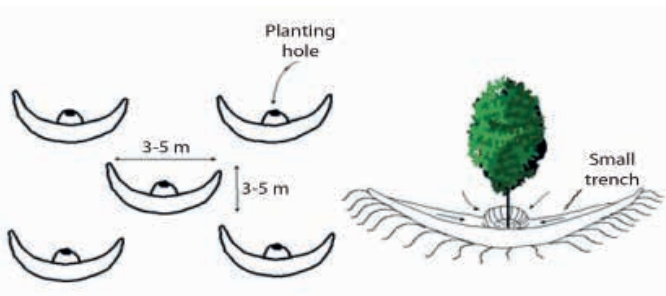
**Demi-lunes in agricultural applications.**  
(Mekdaschi & Liniger 2013)



**Sketch of semi-circular bunds (Mekdaschi & Liniger 2013)**



**Semi-circular bunds (Mekdaschi & Liniger 2013, T. Oweis)**



**Semi-circular bund system (Mekdaschi & Liniger 2013, from Mati, 2005)**

#### Technical and figure citations:

- Ecosphere Environmental Services (EES) and Stream Dynamics (SD). 2020. Plan of Development for Proposed Remediation Work on New Mexico State Trust Lands; NMDOT Lordsburg Playa Watershed Dust Mitigation Project.
- Maestas, J., S. Conner, B. Zeedyk, B. Neeley, R. Rondeau, N. Seward, T. Chapman, and R. Murph. 2018. Hand-built structures for restoring degraded meadows in sagebrush rangelands: examples and lessons learned from the Upper Gunnison River Basin, Colorado. Range technical note; No. 40.
- Mekdaschi, R., and H. Liniger. 2013. Water harvesting: guidelines to good practice. Centre for Development and Environment (CDE), Bern; Rainwater Harvesting Implementation Network (RAIN), Amsterdam; MetaMeta, Wageningen; The International Fund for Agricultural Development (IFAD), Rome.
- Sponholtz, C. and A. C. Anderson. 2013. Erosion Control Field Guide. Quivira Coalition and Watershed Artisans.
- Zeedyk, B and V. Clothier. 2014. Let the Water Do the Work: Induced Meandering, an Evolving Method for Restoring Incised Channels. 2nd edition. Chelsea Green Publishing.

NRCS conservation practice name, code, and expected lifespan: Channel Bed Stabilization (584) (Life span 10 years, (USDA NRCS))

Common practice title: One Rock Dams

Application (for this project): Runoff water management, soil conservation, and erosion mitigation measures in the arroyos that exhibit downstream erosion and entrenchment and have enough width to establish in-channel bars. The practice objective is to control or protect range land from gully erosion, and head cuts caused by runoff with excess volume or energy.

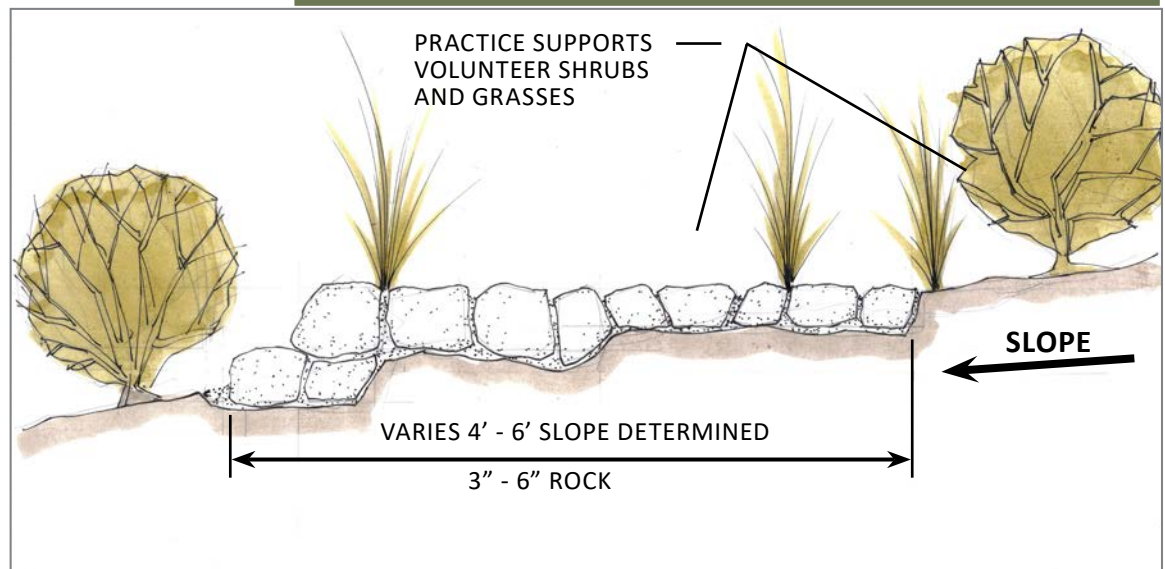
Function: Slow flow, capture sediment and nutrients to support revegetation and increased infiltration

Technical description (see sketch): Low profile on landscape in drainage areas. Per Range Technical Note No. 40 (Maestas, 2018): Placement of one rock dams vary with channel type and morphology. Some key features:

- Build to only one rock high (generally



One-rock dams. Photo by: Nathan Seward



Section: Grade-control structures / One Rock Dam (Davidson)

#### References, Image and Figure citations:

Davidson, R. Section: Grade-control structures / One Rock Dam. Alamosa Land Institute (ALI)

Maestas, J., S. Conner, B. Zeedyk, B. Neeley, R. Rondeau, N. Seward, T. Chapman, and R. Murph. 2018. Hand-built structures for restoring degraded meadows in sagebrush rangelands: examples and lessons learned from the Upper Gunnison River Basin, Colorado. Range technical note; No. 40.

USDA NRCS. Conservation Practices. [https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143\\_026849](https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849). Accessed 8/17/2021.

no more than a third the height of the bankfull channel)

- Build a footer for splash apron on the downstream end that extends far enough (2x the height of the ORD) to intercept water running quickly over the structure in a high flow event.
- Fit rocks together tightly, all at the same height, to create a relatively uniform surface on top.
- Extend the bankside edges of the structure up the bank a bit to facilitate water going over the structure and not around it.

**Installation and staging:** The rock will be sourced locally.

**NRCS conservation practice name and code:** Grade stabilization structures - (410)

**Common practice title:** Cobble Channel Liner

**Application (for this project):** Runoff water management, soil conservation, and erosion mitigation measures in the arroyos that exhibit erosion. The overall practice objective is to control or protect uplands from gully erosion, and head cuts caused by runoff with excess volume or energy.

**Function:** Slow flow, capture sediment and nutrients to support revegetation and increased infiltration

**Technical description:** A Cobble Channel Liner is a long, narrow One Rock Dam, much longer than it is wide, built in a recently incised rill or gully bottom and used to armor the bed and/or reconnect bankfull flow with the recently abandoned floodplain.



**Cobble channel liner. Photo provided by Stream Dynamics and High Desert Native Plants (EES & SD, 2020)**

#### References, Image and Figure citations:

Ecosphere Environmental Services (EES) and Stream Dynamics (SD). 2020. Plan of Development for Proposed Remediation Work on New Mexico State Trust Lands; NMDOT Lordsburg Playa Watershed Dust Mitigation Project.

NRCS conservation

practice name and code:

Grade stabilization structures  
- (410)

Common practice title: Zuni Bowl

Per EES & SD, (2020), Zuni Bowl

Bill Zeedyk observed Native American workers on the Zuni Pueblo building headcut control structures that used the principle of the natural cascade or step pool. Rather than spill the water directly over a high falls, the cascade was used to build a series of smaller steps and pools, keeping the velocity within manageable range.

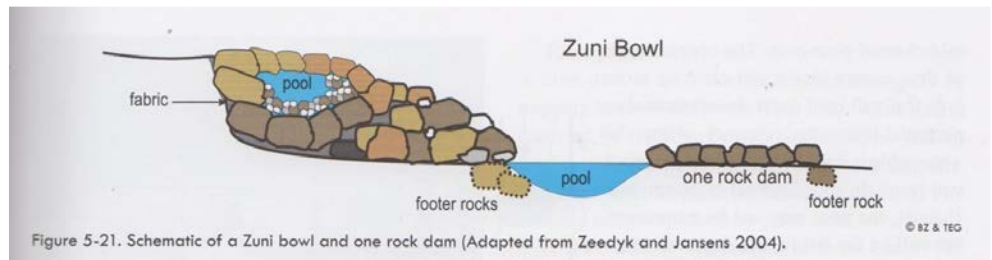
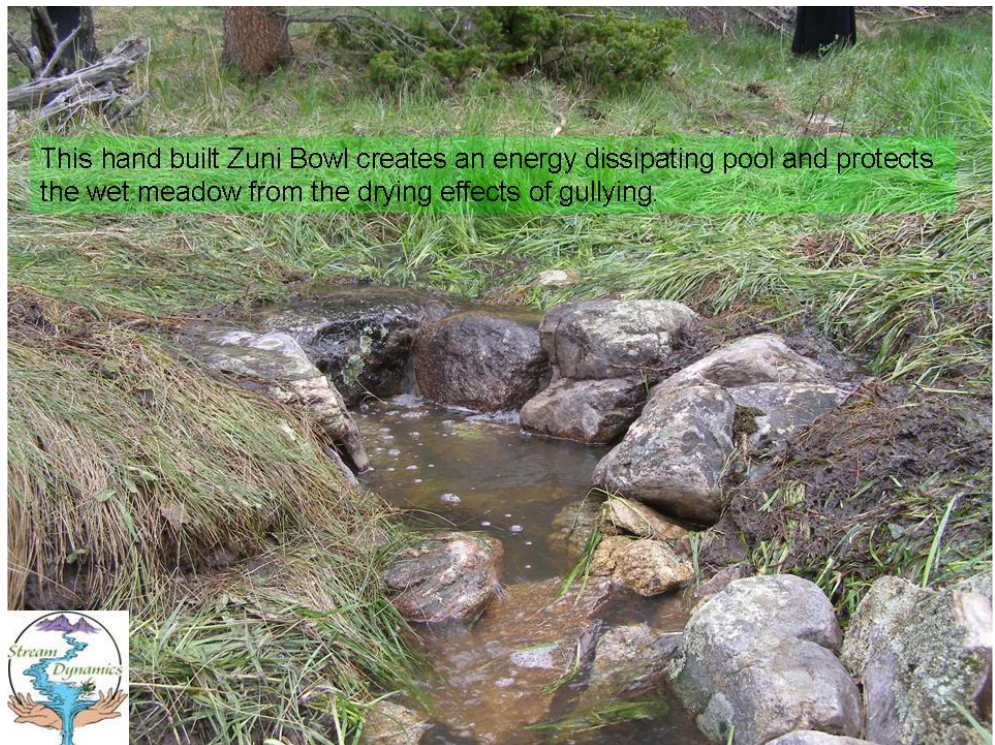


Figure B-3 . Diagram of Zuni Bowl



Photograph B-4 . Zuni Bowl

Zuni Bowl. Photo provided by Stream Dynamics and High Desert Native Plants (EES & SD, 2020)

## References, Image and Figure citations:

Ecosphere Environmental Services (EES) and Stream Dynamics (SD). 2020. Plan of Development for Proposed Remediation Work on New Mexico State Trust Lands; NMDOT Lordsburg Playa Watershed Dust Mitigation Project.

NRCS conservation  
practice name, code, and  
expected lifespan

Diversion (362) (Life span  
10 years, (USDA NRCS))

Common practice title

Road Restoration -  
Rolling dip or Coweeta dip

Technical description

For use on road with a  
grade between 3% and  
15%, and adjacent terrain  
with a cross-slope greater  
than 5%.

Function - the  
construction of a lead-  
out ditch that maintains  
the road velocity through  
the dip and roll-out area  
to divert a portion of the  
flow from the road through  
gravity

Installation and staging:  
The practice is done with a  
road grader.

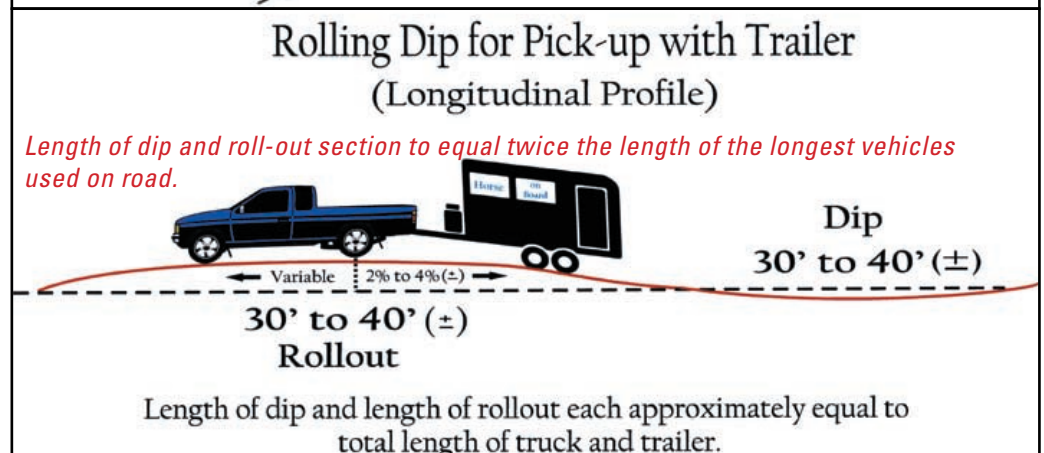
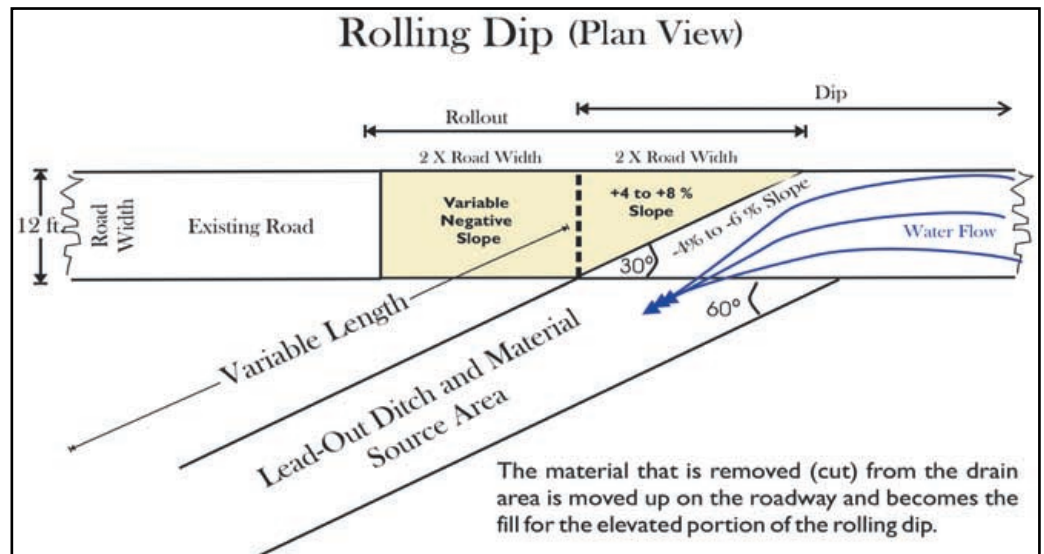
(Zeedyk 2006)

References, Image and  
Figure citations

USDA NRCS. Conservation

Practices. [https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143\\_026849](https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849).  
Accessed 8/17/2021.

Zeedyk, B. 2006. Water harvesting from low-standard rural roads. Santa Fe, NM: Quivira Coalition.



Rolling Dip schematic (Zeedyk, 2006)



completed rolling dip on road and lead-out ditch (Zeedyk, 2006)

**NRCS conservation practice name, code, and expected lifespan**

Diversion (362) (Life span 10 years, (USDA NRCS))

**Common practice title - Road Restoration - Water Bar (Zeedyk 2006)**

**Application:** Waterbars can be used very effectively to drain roads that will be put out of use for an extended period of time.

**Technical description:** A waterbar is a pushed up mound of earth or hump on the roadway used to deflect runoff from the road surface. It is quick, easy and cheap to build with a bulldozer, tractor or backhoe. Waterbars or “thank-you-ma’ams” are usually built at right angles to the roadway, but are more effective when built at an angle of 30° to the grade. Waterbars are normally built to a height of 6 to 24 inches (E in cross-section) above the road surface. Taller structures may be impassable to low clearance vehicles or vehicles towing trailers.

**Function:** to drain an abandoned or low-use road.

**Installation and staging:** The practice is done with a road grader or a backhoe depending on the conditions.

#### References, Image and Figure citations

NM State Forestry. After Wildfire, A Guide for New Mexico Communities: Water Bar 1. <https://afterwildfirenm.org/additional-resources/photo-gallery>. Accessed 6/11/2020.

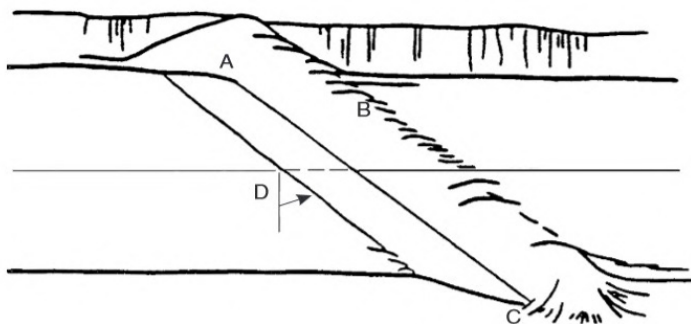
USDA NRCS. Conservation Practices. [https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143\\_026849](https://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/technical/cp/ncps/?cid=nrcs143_026849). Accessed 8/17/2021.

Zeedyk, B. 2006. Water harvesting from low-standard rural roads. Santa Fe, NM: Quivira Coalition.

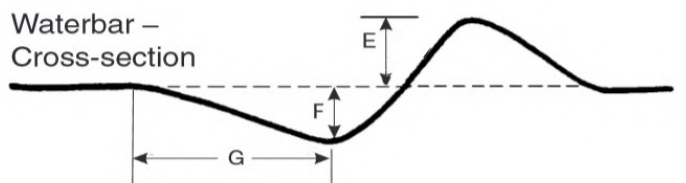


**Water bars (Zeedyk, 2006)**

**Waterbar –  
Top view**



**Waterbar –  
Cross-section**



**Water bar plan/axonometric and cross-section  
(Adapted from NM State Forestry)**

monitoring of low impact restoration:  
equipment technical fact sheet

monitoring fact sheet (p. 1 of 1)  
*flow stage 1 (at outlet)*



*t-post to also include  
(from top) weather station,  
the staff gauge for flow  
height, and the data  
logger and housing for  
all probes and weather  
station, see next pages for  
further information*

*datalogger  
with telemetry  
and barometric  
pressure sensor*

*flood-  
plain*

*turbidity  
and con-  
ductance  
(see next  
page  
for fact  
sheet)*

*Perforated pipe  
(SS, galvanized, or PVC)*

*pressure  
transduc-  
er*

*channel  
bed*

*8' t-post driven approx. 5' into ground  
with approx. 3.2' remaining above the  
surface of the channel bed*

**Equipment:** Flow stage and temperature monitoring, including HOBOT pressure transducers in a protective housing strapped onto a t-post in the channel and on the floodplain

**Issues to be addressed, the monitoring objectives:**  
We will measure stage (flow height) in flows and near the subbasin outlets to analyze surface water flows and runoff dynamics.

**Frequency of monitoring and monitoring transport:**  
monitoring will be continuous and available on a website using telemetry.

**Initial installation transport to site:** The equipment will be brought to the site truck as marked on plans to the closest staging area. Further distribution to the installation site is to be by hand or by UTV on the UTV track locations shown if necessary or if with other equipment.

**Anticipated area of ground disturbance:** will occur in the deployment of equipment, see following description.

**Deployment location:** Stage measure to be placed on the surface of the channel bed in thalweg of channel. The 8' t-post is to be driven approx. 5' into ground with approx. 3.2' remaining above the surface of the channel bed, and the protective housing strapped to it. The logger that provides atmospheric barometric pressure (control for pressure in flow) is to be located on the floodplain next to arroyo, and placed on a 6' t-post, and driven approx. 4'-5' into the ground, with approx. 3'-4' remaining above ground. Note that additional monitors and a solar panel will also be mounted on this t-post.

**Securing the equipment:** A perforated metal pipe/tube (with threads on the top of the pipe) will be placed on the surface of the channel bed and strapped on to the 8' galvanized pipe imbedded in the channel, and a well cap will be screwed onto the top, with the pressure transducer hung on steel wire from the well head top. On the t-post, a small lock to be threaded through the hobo and attached to a chain which wraps around the t-post so that it cannot be slid off. The transducer will be stabilized to the t-post using a hose clamp, with gasket material to protect it from any pressure from securing.



**Equipment:** Current Velocity Meter

**Description:** Swoffer Model 2100 Current Velocity Meter

- Read stream velocity directly from 0.5 to 25 feet (.152 to 7.5 meters) per second
- Velocity displayed in either feet or meters per second
- Three selectable pre-set display update times. 90 second maximum
- Powered by a single standard 9V battery.
- Uses the efficient, propeller-driven Photo-Fiber-Optic sensor pioneered by Swoffer in the 1970's
- Precision quartz crystal controlled electronics provides accurate, precise data in all flow conditions

**Frequency of monitoring and monitoring transport:** monitoring to occur at representative variable times of year, in perennial flow at peaks of seasons, and in ephemeral flow, after flow events primarily during the summer monsoonal seasons, data to be retrieved via foot traffic.

**Initial installation transport to site:** on foot

**Anticipated area of ground disturbance:** none

**Deployment location:** at locations with flow and other measures (see previous fact sheet for flow and temperature)

**References:**

Equipment website:  
<https://swoffer.com/products.htm>



**Equipment:** Turbidity and Conductivity meters, feature titanium sensors. Includes HOB0 Non-Contact sensor conductivity data loggers and measures both conductivity and temperatures in streams, lakes, and other freshwater sources. YSI turbidity sensors are submersible sensors that direct a focused beam into the monitored water.

**Issues to be addressed, the monitoring objectives:** Equipment measuring conductivity, turbidity, flow and temperature (see previous fact sheet for flow and temperature) will be employed. Turbidity is a common surrogate to measure total suspended solids (sediment) content in flows (O'Brien et al., 2016) and in combination of measurements with other surrogates of flow, conductivity, and temperature can provide sediment concentration and dissolved load measurements (Horsburgh et al. 2010). Turbidity is defined as the measure of relative clarity of a liquid, and is measured by the amount of light absorbed and scattered by particles (APHA, 1999). It is an indirect measuring method based on the statistical relationship between sediment concentration and turbidity values as linear, non-linear or polynomial function (Sun et al 20010). At the beginning and end of the deployment, calibration will be done a) to adjust for higher flows, as increased suspended solids passing the meter (O'Brien et al., 2016), b) to subtract the organic content from the conductivity measures (Godsey, 2009), and c) temperature to adjust for the effects to the electric components of the sensors (Lawler & Brown 1992).

## References:

Equipment website:

[https://www.onsetcomp.com/products/data-loggers/u24-001?creative=178262173812&keyword=&matchtype=&network=g&device=c&gclid=Cj0KCQjw3eeXBhD7ARIsAHjssr8Wuf9PlvZKnSdFj0SMP6UnsdGANmshJDCe\\_ojUCmzcTzWiAHE7CNcaAkKfEALw\\_wcB](https://www.onsetcomp.com/products/data-loggers/u24-001?creative=178262173812&keyword=&matchtype=&network=g&device=c&gclid=Cj0KCQjw3eeXBhD7ARIsAHjssr8Wuf9PlvZKnSdFj0SMP6UnsdGANmshJDCe_ojUCmzcTzWiAHE7CNcaAkKfEALw_wcB)

<https://www.ysi.com/wq730>

**Frequency of monitoring and monitoring transport:** in combination with flow and temperature (see previous fact sheet for flow and temperature)

**Initial installation transport to site:** in combination with flow and temperature (see previous fact sheet for flow and temperature)

**Anticipated area of ground disturbance:** in combination with flow and temperature (see previous fact sheet for flow and temperature)

**Deployment location:** in combination with flow and temperature (see previous fact sheet for flow and temperature). Since the turbidity sensor uses light to detect the water's turbidity ensure that the minimum amount of external light possible is exposed to the monitoring site.

monitoring fact sheet (p. 1 of 1)  
*small weather station*  
(at outlet)



**Equipment:** Compact Digital Weather Sensor connected to the datalogger, which is also collecting data from the soil moisture probes (Complete Weather Sensor with No Moving Parts).

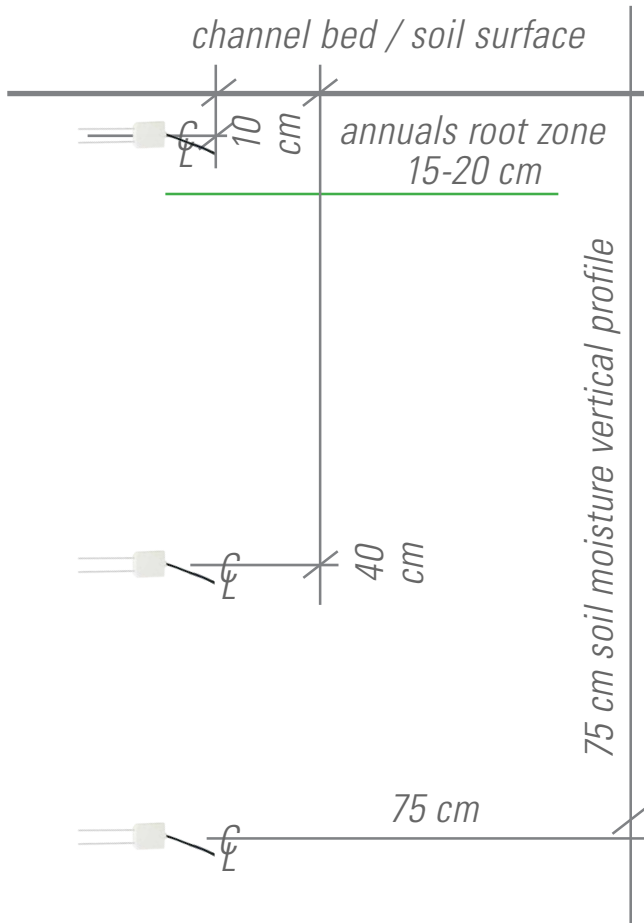
**Issues to be addressed, the monitoring objectives:** We will measure precipitation to calibrate the NEXRAD spatially distributed precipitation data

**Frequency of monitoring and monitoring transport:** monitoring to occur after flow events primarily during the summer monsoonal seasons, data to be retrieved via foot traffic.

**Initial installation transport to site:** The equipment will be brought to the site truck as marked on the plan to the closest staging area. Further distribution to the installation site is to be by hand or by UTV on the UTV track locations shown on the plan if necessary or if with other equipment.

**Anticipated area of ground disturbance:** will occur in the deployment of equipment, see following description.

**Deployment location:** The weather station will be located on the floodplain next to arroyo, and placed on the same 6' t-post that is described in the flow stage 1 fact sheet (see image of the t-post on that sheet), and driven approx. 4'-5' into the ground, with approx. 3'-4' remaining above ground. Note that the wildlife cameras, the data loggers in the housing and with the solar panel will also be mounted on this t-post.



*soil  
moisture  
probe*

**Equipment:** Soil moisture and temperature sensor connected

**Issues to be addressed, the monitoring objectives:** To measure the effects of connectivity of flow to floodplains, we will measure the soil moisture and infiltration rates at areas of inundation.

**Frequency of monitoring and monitoring transport:** in combination with flow and temperature (see previous fact sheet for flow and temperature)

**Initial installation transport to site:** in combination with flow and temperature (see previous fact sheet for flow and temperature)

**Anticipated area of ground disturbance:** in combination with flow and temperature (see previous fact sheet for flow and temperature)

**Installation method:** A hole 75 cm deep, ~60cm wide is to be dug, with a clean face cut on the side that the soil moisture probes are to be installed. If the soil is high density or rocky, use a Rod Insertion Guide Tool with Pilot Rod, the tool is inserted prior to probe insertion. The soil moisture probes are to be oriented horizontally to detect the passing of wetting fronts and other vertical water fluxes. Note that the minimum depth for the sensor is 7.5 cm from the surface to the sensor due to sensitivity range (to ensure measures do not include air above ground).

#### References:

Equipment website: <https://www.onsetcomp.com/products/data-loggers/mx230x/>



**ADDENDUM II) BERNALILLO  
WATERSHED WORKSHOP  
PRECIPITATION FREQUENCIES**

NOAA Atlas 14, Volume 1, Version 5 BERNALILLO  
1 NNE



Station ID: 29-0903  
Location name: New Mexico, USA\*  
Latitude: 35.3333°, Longitude: -106.5333°  
Elevation:  
Elevation (station metadata): 5062 ft\*\*  
\* source: ESRI Maps  
\*\* source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.172 (0.149-0.197)	0.222 (0.194-0.254)	0.297 (0.258-0.342)	0.354 (0.307-0.405)	0.433 (0.373-0.498)	0.494 (0.421-0.569)	0.558 (0.472-0.641)	0.625 (0.527-0.718)	0.717 (0.597-0.824)	0.788 (0.651-0.907)
10-min	0.262 (0.226-0.300)	0.337 (0.295-0.387)	0.453 (0.393-0.520)	0.539 (0.467-0.617)	0.660 (0.568-0.758)	0.753 (0.641-0.866)	0.849 (0.719-0.976)	0.951 (0.802-1.09)	1.09 (0.910-1.25)	1.20 (0.991-1.38)
15-min	0.325 (0.280-0.372)	0.418 (0.366-0.480)	0.562 (0.487-0.645)	0.668 (0.579-0.765)	0.818 (0.703-0.940)	0.933 (0.795-1.07)	1.05 (0.891-1.21)	1.18 (0.994-1.36)	1.35 (1.13-1.55)	1.49 (1.23-1.71)
30-min	0.438 (0.378-0.501)	0.564 (0.492-0.646)	0.756 (0.656-0.869)	0.899 (0.779-1.03)	1.10 (0.947-1.27)	1.26 (1.07-1.45)	1.42 (1.20-1.63)	1.59 (1.34-1.83)	1.82 (1.52-2.09)	2.00 (1.65-2.30)
60-min	0.542 (0.468-0.620)	0.698 (0.610-0.800)	0.936 (0.812-1.08)	1.11 (0.965-1.27)	1.36 (1.17-1.57)	1.56 (1.33-1.79)	1.75 (1.49-2.02)	1.96 (1.66-2.26)	2.25 (1.88-2.59)	2.48 (2.05-2.85)
2-hr	0.619 (0.534-0.724)	0.794 (0.679-0.934)	1.04 (0.892-1.22)	1.25 (1.06-1.46)	1.52 (1.29-1.78)	1.74 (1.47-2.04)	1.98 (1.65-2.30)	2.23 (1.84-2.59)	2.57 (2.09-2.99)	2.84 (2.29-3.31)
3-hr	0.672 (0.584-0.779)	0.853 (0.742-0.985)	1.11 (0.959-1.29)	1.32 (1.13-1.52)	1.60 (1.36-1.84)	1.83 (1.55-2.10)	2.07 (1.74-2.38)	2.33 (1.94-2.67)	2.67 (2.20-3.07)	2.96 (2.41-3.42)
6-hr	0.782 (0.685-0.894)	0.981 (0.861-1.13)	1.26 (1.11-1.44)	1.48 (1.29-1.69)	1.78 (1.54-2.02)	2.01 (1.73-2.28)	2.25 (1.93-2.56)	2.50 (2.12-2.84)	2.85 (2.38-3.23)	3.12 (2.60-3.55)
12-hr	0.876 (0.785-0.982)	1.10 (0.989-1.23)	1.39 (1.24-1.55)	1.61 (1.43-1.80)	1.91 (1.69-2.13)	2.15 (1.89-2.40)	2.39 (2.09-2.67)	2.64 (2.30-2.95)	2.97 (2.55-3.32)	3.24 (2.76-3.63)
24-hr	1.00 (0.914-1.10)	1.25 (1.14-1.38)	1.56 (1.42-1.73)	1.81 (1.65-1.99)	2.15 (1.94-2.36)	2.40 (2.17-2.64)	2.66 (2.40-2.92)	2.93 (2.63-3.21)	3.30 (2.93-3.61)	3.58 (3.16-3.92)
2-day	1.10 (0.995-1.21)	1.37 (1.25-1.51)	1.71 (1.55-1.89)	1.98 (1.80-2.17)	2.34 (2.12-2.57)	2.61 (2.36-2.87)	2.89 (2.61-3.18)	3.18 (2.85-3.49)	3.56 (3.17-3.92)	3.85 (3.42-4.24)
3-day	1.18 (1.08-1.29)	1.47 (1.35-1.61)	1.82 (1.67-1.99)	2.10 (1.92-2.29)	2.47 (2.26-2.69)	2.75 (2.51-3.00)	3.04 (2.77-3.32)	3.33 (3.02-3.63)	3.72 (3.36-4.06)	4.02 (3.61-4.39)
4-day	1.26 (1.17-1.37)	1.57 (1.45-1.70)	1.93 (1.79-2.10)	2.22 (2.05-2.40)	2.60 (2.40-2.82)	2.89 (2.67-3.13)	3.19 (2.93-3.45)	3.48 (3.19-3.76)	3.88 (3.54-4.20)	4.18 (3.80-4.54)
7-day	1.44 (1.34-1.56)	1.79 (1.67-1.93)	2.19 (2.05-2.36)	2.50 (2.33-2.68)	2.91 (2.71-3.12)	3.21 (2.99-3.45)	3.52 (3.27-3.78)	3.82 (3.54-4.10)	4.21 (3.88-4.53)	4.49 (4.13-4.85)
10-day	1.59 (1.48-1.71)	1.98 (1.84-2.12)	2.43 (2.26-2.60)	2.78 (2.59-2.97)	3.24 (3.01-3.46)	3.60 (3.33-3.84)	3.95 (3.65-4.20)	4.30 (3.96-4.58)	4.76 (4.36-5.08)	5.10 (4.66-5.45)
20-day	1.99 (1.84-2.13)	2.47 (2.29-2.66)	3.00 (2.80-3.22)	3.40 (3.16-3.65)	3.91 (3.64-4.19)	4.29 (3.98-4.58)	4.65 (4.30-4.97)	4.99 (4.61-5.34)	5.43 (5.00-5.81)	5.74 (5.28-6.15)
30-day	2.38 (2.21-2.55)	2.95 (2.74-3.17)	3.55 (3.30-3.81)	4.00 (3.71-4.28)	4.56 (4.24-4.88)	4.96 (4.60-5.31)	5.35 (4.95-5.71)	5.71 (5.28-6.09)	6.15 (5.66-6.56)	6.46 (5.93-6.91)
45-day	2.87 (2.67-3.07)	3.55 (3.31-3.80)	4.24 (3.94-4.52)	4.73 (4.39-5.05)	5.33 (4.95-5.68)	5.73 (5.33-6.12)	6.11 (5.67-6.50)	6.44 (5.98-6.86)	6.83 (6.35-7.27)	7.08 (6.58-7.54)
60-day	3.29 (3.07-3.53)	4.09 (3.80-4.38)	4.87 (4.54-5.22)	5.43 (5.06-5.81)	6.12 (5.69-6.54)	6.58 (6.13-7.03)	7.01 (6.52-7.49)	7.40 (6.88-7.91)	7.85 (7.30-8.39)	8.13 (7.57-8.69)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

NOAA Atlas 14, Volume 1, Version 5 STATE  
UNIVERSITY



Station ID: 29-8535  
Location name: Las Cruces, New Mexico, USA\*  
Latitude: 32.2806°, Longitude: -106.7675°



Elevation:  
Elevation (station metadata): 3881 ft\*\*

\* source: ESRI Maps

\*\* source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps & aeriels](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.218 (0.190-0.248)	0.282 (0.247-0.322)	0.380 (0.333-0.432)	0.456 (0.398-0.517)	0.558 (0.484-0.631)	0.640 (0.552-0.724)	0.726 (0.623-0.820)	0.815 (0.695-0.922)	0.937 (0.791-1.06)	1.04 (0.869-1.18)
10-min	0.332 (0.288-0.378)	0.430 (0.377-0.490)	0.578 (0.507-0.657)	0.695 (0.605-0.787)	0.849 (0.737-0.960)	0.975 (0.841-1.10)	1.11 (0.948-1.25)	1.24 (1.06-1.40)	1.43 (1.20-1.62)	1.58 (1.32-1.79)
15-min	0.411 (0.358-0.468)	0.533 (0.467-0.607)	0.717 (0.628-0.815)	0.861 (0.751-0.976)	1.05 (0.913-1.19)	1.21 (1.04-1.37)	1.37 (1.18-1.55)	1.54 (1.31-1.74)	1.77 (1.49-2.00)	1.96 (1.64-2.22)
30-min	0.553 (0.482-0.630)	0.718 (0.629-0.818)	0.966 (0.846-1.10)	1.16 (1.01-1.31)	1.42 (1.23-1.60)	1.63 (1.40-1.84)	1.84 (1.58-2.09)	2.07 (1.76-2.34)	2.38 (2.01-2.70)	2.64 (2.21-2.99)
60-min	0.685 (0.596-0.780)	0.888 (0.778-1.01)	1.20 (1.05-1.36)	1.43 (1.25-1.63)	1.76 (1.52-1.98)	2.01 (1.74-2.28)	2.28 (1.96-2.58)	2.56 (2.18-2.90)	2.95 (2.49-3.34)	3.26 (2.73-3.70)
2-hr	0.785 (0.691-0.890)	1.02 (0.898-1.16)	1.37 (1.21-1.55)	1.65 (1.45-1.86)	2.03 (1.77-2.29)	2.34 (2.02-2.62)	2.65 (2.27-2.98)	2.99 (2.53-3.35)	3.44 (2.88-3.87)	3.81 (3.15-4.28)
3-hr	0.826 (0.734-0.935)	1.06 (0.944-1.21)	1.42 (1.26-1.61)	1.70 (1.50-1.91)	2.08 (1.82-2.34)	2.39 (2.08-2.68)	2.71 (2.34-3.04)	3.05 (2.60-3.41)	3.51 (2.95-3.94)	3.88 (3.23-4.36)
6-hr	0.943 (0.842-1.06)	1.20 (1.08-1.35)	1.58 (1.41-1.77)	1.86 (1.65-2.08)	2.26 (1.99-2.52)	2.56 (2.24-2.86)	2.88 (2.50-3.20)	3.20 (2.76-3.57)	3.65 (3.11-4.08)	4.01 (3.38-4.49)
12-hr	1.03 (0.922-1.15)	1.31 (1.18-1.46)	1.70 (1.52-1.89)	2.00 (1.78-2.22)	2.39 (2.12-2.65)	2.69 (2.38-2.98)	3.00 (2.63-3.33)	3.31 (2.89-3.68)	3.73 (3.22-4.15)	4.06 (3.48-4.54)
24-hr	1.07 (0.993-1.15)	1.34 (1.25-1.48)	1.78 (1.63-1.94)	2.15 (1.93-2.38)	2.72 (2.35-3.13)	3.21 (2.67-3.84)	3.77 (2.99-4.73)	4.40 (3.33-5.80)	5.35 (3.82-7.61)	6.18 (4.17-9.37)
2-day	1.14 (1.07-1.23)	1.44 (1.34-1.56)	1.90 (1.75-2.06)	2.28 (2.06-2.52)	2.85 (2.48-3.25)	3.33 (2.82-3.94)	3.87 (3.13-4.80)	4.46 (3.47-5.86)	5.39 (3.91-7.68)	6.22 (4.31-9.46)
3-day	1.22 (1.13-1.32)	1.56 (1.44-1.68)	2.05 (1.88-2.23)	2.46 (2.22-2.70)	3.04 (2.66-3.45)	3.52 (3.00-4.12)	4.04 (3.32-4.93)	4.60 (3.65-5.87)	5.52 (4.13-7.72)	6.36 (4.56-9.51)
4-day	1.30 (1.20-1.41)	1.67 (1.54-1.81)	2.20 (2.02-2.39)	2.63 (2.38-2.88)	3.23 (2.84-3.64)	3.70 (3.19-4.30)	4.21 (3.51-5.05)	4.74 (3.83-5.88)	5.65 (4.35-7.76)	6.49 (4.81-9.55)
7-day	1.50 (1.39-1.62)	1.92 (1.78-2.08)	2.53 (2.34-2.74)	3.02 (2.75-3.31)	3.70 (3.27-4.15)	4.23 (3.66-4.89)	4.80 (4.03-5.72)	5.40 (4.40-6.64)	6.23 (4.84-8.08)	6.90 (5.19-9.65)
10-day	1.67 (1.55-1.82)	2.15 (1.98-2.34)	2.85 (2.62-3.10)	3.40 (3.09-3.72)	4.15 (3.67-4.65)	4.74 (4.10-5.46)	5.36 (4.52-6.35)	6.00 (4.90-7.35)	6.89 (5.39-8.84)	7.58 (5.75-10.1)
20-day	2.14 (1.98-2.32)	2.75 (2.54-2.97)	3.58 (3.31-3.87)	4.20 (3.85-4.57)	5.03 (4.51-5.57)	5.66 (4.98-6.42)	6.30 (5.42-7.32)	6.92 (5.82-8.29)	7.78 (6.30-9.69)	8.43 (6.65-10.9)
30-day	2.55 (2.37-2.75)	3.25 (3.01-3.50)	4.17 (3.86-4.49)	4.87 (4.47-5.29)	5.81 (5.22-6.43)	6.51 (5.75-7.38)	7.22 (6.23-8.40)	7.94 (6.68-9.50)	8.89 (7.21-11.1)	9.62 (7.62-12.5)
45-day	3.10 (2.87-3.34)	3.94 (3.67-4.25)	5.00 (4.67-5.38)	5.78 (5.35-6.24)	6.76 (6.16-7.42)	7.47 (6.72-8.35)	8.17 (7.20-9.31)	8.83 (7.63-10.3)	9.68 (8.13-11.7)	10.3 (8.49-12.8)
60-day	3.56 (3.29-3.83)	4.52 (4.21-4.87)	5.72 (5.34-6.15)	6.57 (6.10-7.09)	7.64 (6.98-8.34)	8.39 (7.57-9.31)	9.12 (8.10-10.3)	9.81 (8.52-11.3)	10.7 (9.04-12.7)	11.3 (9.39-13.7)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

NOAA Atlas 14, Volume 1, Version 5 ESPANOLA

Station ID: 29-3031

Location name: Espanola, New Mexico, USA\*

Latitude: 35.9833°, Longitude: -106.0667°

Elevation:

Elevation (station metadata): 5590 ft\*\*

\* source: ESRI Maps

\*\* source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF\\_tabular](#) | [PF\\_graphical](#) | [Maps\\_&\\_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)<sup>1</sup>

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.191 (0.166-0.220)	0.247 (0.216-0.284)	0.331 (0.288-0.381)	0.397 (0.344-0.456)	0.489 (0.421-0.561)	0.561 (0.480-0.644)	0.639 (0.541-0.735)	0.721 (0.605-0.831)	0.833 (0.689-0.967)	0.924 (0.755-1.08)
10-min	0.291 (0.253-0.334)	0.376 (0.328-0.433)	0.504 (0.439-0.580)	0.604 (0.523-0.694)	0.744 (0.640-0.854)	0.854 (0.730-0.981)	0.973 (0.824-1.12)	1.10 (0.920-1.27)	1.27 (1.05-1.47)	1.41 (1.15-1.64)
15-min	0.360 (0.314-0.414)	0.466 (0.407-0.536)	0.625 (0.544-0.719)	0.748 (0.649-0.860)	0.922 (0.794-1.06)	1.06 (0.905-1.22)	1.21 (1.02-1.39)	1.36 (1.14-1.57)	1.57 (1.30-1.83)	1.74 (1.43-2.04)
30-min	0.485 (0.423-0.558)	0.627 (0.548-0.722)	0.841 (0.732-0.968)	1.01 (0.873-1.16)	1.24 (1.07-1.43)	1.43 (1.22-1.64)	1.63 (1.38-1.87)	1.83 (1.54-2.11)	2.12 (1.75-2.46)	2.35 (1.92-2.74)
60-min	0.600 (0.523-0.690)	0.776 (0.678-0.893)	1.04 (0.906-1.20)	1.25 (1.08-1.43)	1.54 (1.32-1.77)	1.76 (1.51-2.03)	2.01 (1.70-2.31)	2.27 (1.90-2.62)	2.62 (2.17-3.04)	2.91 (2.38-3.39)
2-hr	0.708 (0.619-0.823)	0.907 (0.791-1.05)	1.20 (1.04-1.40)	1.44 (1.25-1.67)	1.77 (1.52-2.05)	2.04 (1.73-2.35)	2.32 (1.96-2.69)	2.63 (2.19-3.05)	3.05 (2.50-3.56)	3.39 (2.74-3.97)
3-hr	0.745 (0.655-0.861)	0.946 (0.830-1.09)	1.23 (1.08-1.42)	1.47 (1.28-1.69)	1.80 (1.56-2.07)	2.07 (1.77-2.38)	2.36 (2.00-2.71)	2.66 (2.23-3.07)	3.09 (2.55-3.58)	3.44 (2.80-3.99)
6-hr	0.851 (0.753-0.971)	1.07 (0.950-1.23)	1.38 (1.21-1.57)	1.62 (1.42-1.84)	1.96 (1.70-2.23)	2.23 (1.92-2.53)	2.52 (2.15-2.87)	2.82 (2.39-3.22)	3.25 (2.70-3.72)	3.59 (2.95-4.13)
12-hr	0.946 (0.846-1.07)	1.19 (1.06-1.34)	1.50 (1.34-1.69)	1.75 (1.55-1.97)	2.09 (1.85-2.35)	2.36 (2.07-2.66)	2.64 (2.30-2.98)	2.94 (2.54-3.33)	3.35 (2.86-3.81)	3.68 (3.10-4.20)
24-hr	1.10 (0.998-1.20)	1.36 (1.24-1.49)	1.69 (1.55-1.86)	1.96 (1.79-2.15)	2.34 (2.13-2.55)	2.64 (2.39-2.87)	2.94 (2.66-3.20)	3.26 (2.93-3.54)	3.69 (3.30-4.01)	4.04 (3.58-4.39)
2-day	1.16 (1.07-1.26)	1.44 (1.32-1.57)	1.78 (1.63-1.94)	2.05 (1.87-2.24)	2.43 (2.21-2.64)	2.72 (2.47-2.95)	3.03 (2.73-3.28)	3.34 (3.00-3.62)	3.76 (3.36-4.08)	4.09 (3.64-4.44)
3-day	1.24 (1.14-1.37)	1.55 (1.41-1.70)	1.91 (1.73-2.09)	2.20 (1.99-2.41)	2.60 (2.35-2.84)	2.91 (2.62-3.18)	3.23 (2.90-3.53)	3.56 (3.18-3.89)	4.00 (3.55-4.37)	4.35 (3.84-4.76)
4-day	1.33 (1.20-1.47)	1.65 (1.50-1.82)	2.03 (1.84-2.24)	2.34 (2.12-2.58)	2.76 (2.49-3.04)	3.09 (2.77-3.40)	3.43 (3.07-3.78)	3.78 (3.36-4.16)	4.24 (3.75-4.66)	4.60 (4.05-5.07)
7-day	1.56 (1.42-1.69)	1.93 (1.76-2.10)	2.36 (2.15-2.57)	2.69 (2.45-2.94)	3.15 (2.86-3.43)	3.49 (3.16-3.81)	3.84 (3.47-4.19)	4.19 (3.77-4.58)	4.65 (4.16-5.09)	5.00 (4.45-5.48)
10-day	1.70 (1.56-1.86)	2.11 (1.93-2.30)	2.56 (2.35-2.79)	2.92 (2.67-3.18)	3.40 (3.10-3.71)	3.77 (3.43-4.10)	4.13 (3.74-4.49)	4.50 (4.06-4.90)	4.97 (4.46-5.42)	5.33 (4.76-5.80)
20-day	2.16 (1.98-2.36)	2.67 (2.45-2.92)	3.23 (2.96-3.53)	3.66 (3.34-3.99)	4.22 (3.85-4.61)	4.65 (4.22-5.08)	5.06 (4.59-5.53)	5.47 (4.94-5.99)	5.99 (5.39-6.57)	6.37 (5.72-7.00)
30-day	2.58 (2.39-2.81)	3.19 (2.95-3.48)	3.83 (3.54-4.16)	4.30 (3.98-4.68)	4.91 (4.54-5.33)	5.36 (4.94-5.81)	5.79 (5.33-6.27)	6.20 (5.70-6.72)	6.71 (6.14-7.27)	7.08 (6.46-7.69)
45-day	3.10 (2.87-3.34)	3.81 (3.53-4.11)	4.54 (4.20-4.87)	5.07 (4.70-5.44)	5.74 (5.31-6.15)	6.20 (5.74-6.66)	6.65 (6.14-7.13)	7.05 (6.52-7.57)	7.53 (6.96-8.09)	7.85 (7.25-8.42)
60-day	3.49 (3.24-3.76)	4.29 (3.98-4.62)	5.09 (4.72-5.47)	5.67 (5.26-6.09)	6.40 (5.93-6.86)	6.90 (6.39-7.40)	7.38 (6.84-7.91)	7.82 (7.24-8.39)	8.33 (7.70-8.94)	8.66 (8.01-9.31)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

## NOAA Atlas 14, Volume 1, Version 5 PORTALES

Station ID: 29-7008

Location name: Portales, New Mexico, USA\*

Latitude: 34.1742°, Longitude: -103.3519°

Elevation:

Elevation (station metadata): 4010 ft\*\*

\* source: ESRI Maps

\*\* source: USGS



## POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

## PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.336 (0.297-0.382)	0.434 (0.384-0.492)	0.572 (0.505-0.649)	0.680 (0.597-0.770)	0.825 (0.721-0.933)	0.939 (0.817-1.06)	1.06 (0.913-1.19)	1.18 (1.01-1.33)	1.34 (1.14-1.51)	1.47 (1.24-1.66)
10-min	0.512 (0.453-0.581)	0.660 (0.584-0.749)	0.871 (0.769-0.988)	1.03 (0.909-1.17)	1.25 (1.10-1.42)	1.43 (1.24-1.62)	1.61 (1.39-1.82)	1.79 (1.54-2.02)	2.04 (1.74-2.31)	2.24 (1.89-2.53)
15-min	0.634 (0.561-0.720)	0.818 (0.724-0.928)	1.08 (0.953-1.22)	1.28 (1.13-1.45)	1.56 (1.36-1.76)	1.77 (1.54-2.00)	1.99 (1.72-2.25)	2.22 (1.91-2.51)	2.53 (2.15-2.86)	2.77 (2.35-3.14)
30-min	0.854 (0.755-0.970)	1.10 (0.975-1.25)	1.45 (1.28-1.65)	1.73 (1.52-1.96)	2.10 (1.83-2.37)	2.38 (2.07-2.70)	2.68 (2.32-3.03)	2.99 (2.57-3.38)	3.40 (2.90-3.85)	3.73 (3.16-4.23)
60-min	1.06 (0.935-1.20)	1.36 (1.21-1.55)	1.80 (1.59-2.04)	2.14 (1.88-2.42)	2.59 (2.27-2.93)	2.95 (2.57-3.34)	3.32 (2.87-3.75)	3.70 (3.18-4.18)	4.21 (3.59-4.76)	4.62 (3.91-5.23)
2-hr	1.23 (1.09-1.40)	1.58 (1.39-1.80)	2.09 (1.84-2.37)	2.49 (2.19-2.83)	3.05 (2.66-3.45)	3.49 (3.03-3.94)	3.96 (3.42-4.47)	4.45 (3.81-5.02)	5.12 (4.34-5.77)	5.66 (4.76-6.40)
3-hr	1.31 (1.17-1.48)	1.68 (1.49-1.90)	2.21 (1.96-2.50)	2.64 (2.33-2.98)	3.23 (2.84-3.64)	3.70 (3.23-4.17)	4.21 (3.64-4.74)	4.73 (4.06-5.33)	5.47 (4.63-6.16)	6.06 (5.08-6.84)
6-hr	1.52 (1.36-1.70)	1.93 (1.73-2.16)	2.52 (2.25-2.83)	3.00 (2.66-3.35)	3.67 (3.24-4.10)	4.21 (3.69-4.69)	4.78 (4.17-5.33)	5.39 (4.65-6.01)	6.24 (5.32-6.96)	6.93 (5.84-7.75)
12-hr	1.71 (1.53-1.92)	2.17 (1.95-2.43)	2.82 (2.52-3.16)	3.35 (2.97-3.74)	4.09 (3.61-4.56)	4.68 (4.11-5.21)	5.32 (4.64-5.91)	5.99 (5.18-6.66)	6.93 (5.91-7.71)	7.69 (6.49-8.57)
24-hr	1.90 (1.74-2.07)	2.39 (2.20-2.61)	3.09 (2.84-3.37)	3.65 (3.34-3.99)	4.45 (4.05-4.85)	5.11 (4.62-5.56)	5.79 (5.20-6.30)	6.51 (5.81-7.09)	7.53 (6.64-8.20)	8.35 (7.30-9.11)
2-day	2.08 (1.92-2.25)	2.63 (2.43-2.86)	3.40 (3.13-3.70)	4.03 (3.70-4.38)	4.93 (4.50-5.35)	5.66 (5.13-6.14)	6.44 (5.80-7.00)	7.28 (6.50-7.92)	8.46 (7.48-9.25)	9.42 (8.24-10.3)
3-day	2.22 (2.04-2.42)	2.82 (2.59-3.07)	3.66 (3.35-4.00)	4.36 (3.98-4.75)	5.37 (4.88-5.85)	6.19 (5.59-6.75)	7.08 (6.34-7.73)	8.04 (7.14-8.78)	9.41 (8.25-10.3)	10.5 (9.14-11.6)
4-day	2.37 (2.17-2.60)	3.00 (2.75-3.29)	3.92 (3.58-4.29)	4.69 (4.26-5.13)	5.80 (5.26-6.35)	6.72 (6.04-7.36)	7.72 (6.89-8.45)	8.80 (7.79-9.64)	10.4 (9.03-11.4)	11.6 (10.0-12.9)
7-day	2.74 (2.50-3.01)	3.47 (3.17-3.81)	4.52 (4.12-4.97)	5.37 (4.88-5.92)	6.60 (5.95-7.26)	7.59 (6.81-8.34)	8.65 (7.72-9.50)	9.78 (8.68-10.8)	11.4 (9.98-12.6)	12.7 (11.0-14.1)
10-day	3.01 (2.76-3.31)	3.82 (3.50-4.19)	4.94 (4.51-5.42)	5.85 (5.34-6.42)	7.13 (6.46-7.81)	8.16 (7.36-8.94)	9.25 (8.30-10.1)	10.4 (9.26-11.4)	12.0 (10.6-13.3)	13.3 (11.6-14.7)
20-day	3.91 (3.57-4.31)	4.95 (4.50-5.47)	6.31 (5.74-6.99)	7.39 (6.68-8.18)	8.85 (7.96-9.79)	9.99 (8.96-11.1)	11.2 (9.98-12.4)	12.4 (11.0-13.7)	14.0 (12.3-15.6)	15.3 (13.3-17.0)
30-day	4.57 (4.19-5.01)	5.77 (5.29-6.33)	7.31 (6.69-8.01)	8.51 (7.77-9.31)	10.1 (9.20-11.0)	11.3 (10.3-12.4)	12.6 (11.4-13.8)	13.9 (12.4-15.2)	15.5 (13.8-17.1)	16.8 (14.9-18.6)
45-day	5.51 (5.06-6.03)	6.94 (6.39-7.60)	8.77 (8.05-9.60)	10.2 (9.35-11.2)	12.1 (11.1-13.3)	13.6 (12.4-14.9)	15.1 (13.7-16.5)	16.7 (15.0-18.2)	18.7 (16.7-20.5)	20.3 (18.0-22.3)
60-day	6.43 (5.95-6.98)	8.08 (7.48-8.77)	10.1 (9.32-10.9)	11.6 (10.7-12.6)	13.7 (12.6-14.8)	15.2 (13.9-16.5)	16.7 (15.3-18.1)	18.3 (16.6-19.8)	20.2 (18.3-22.0)	21.7 (19.5-23.8)

<sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.



The following is edited and reordered for conciseness and clarity. For the farmer that did not want to be identified, all identifying indicators were removed. All items in italics are summary points that are included in this Plan's Section 2 *Regional Values, Issues, Strategies, and Visions for the Future*.

#### Introductions

- *Shayne Franzoy: I'm Shayne Franzoy and I farm in the area and I'm also am the Secretary of the McClellan Watershed District. Scott Adams is the president. He is out of town right now, or else he would be here. But there's really only me and Scott on that board because the way that district lines up, we're the only two landowners in that area that want to participate in [the district]. And there's only maybe four or five total.*
- *Farmer 2: I am a farmer and the son of a farmer [also a young farmer]*
- *Susie Downs: Susie Downs, administrative assistant / district manager for Caballo Soil and Water.*
- *Connie Maxwell from the New Mexico Water Resources Research Institute*
- *Kaustuv Neupane: I work with Connie and I'm a PhD student at NMSU, and I have been working on the watershed research and activities with Connie and I have been in New Mexico for a year now. [Connie Maxwell: Kaustuv is from Nepal and he's done a lot of watershed restoration there as well.]*

#### Value about the area / Visions for the Future

- *Shayne Franzoy: I am a fourth generation farmer, actually fifth. My great grandfather came here when the irrigation project was in its infancy. He homesteaded some property not far from here. And so we continued to do that. I grew up in the ag community. And the goal for me would be to keep it as close to what it is today, for the future. And that's it. The vision for the future is to just try to maintain that ag community as best as we can.*
- *Farmer 2: I think it's a good lifestyle. It's a good place to raise your kids and we have a good long line in our community. We have a lot of farmers that have been here around the same time that we came here, and a lot of those farms haven't really changed hands. It's still the same people farming and managing them. And I think it's just a real tight-knit community and it's a good place to work and raise a family and provide work for other families that have been here just as long. We provide a lot of jobs for a lot of people and a lot of the families have stayed here and we provided a good living for the whole valley and I really enjoy seeing that and watching the older*

## ADDENDUM III) FARMER AND CABALLO SWCD FOCUS GROUP: TRANSCRIPT

generations and the younger and then now the upcoming generation now that I'm getting older. It's just neat to see all these families that stick together around here.

*[Collaboration to address conflicts is beneficial]*

- Shayne Franzoy: The way it is and and I think with *the climate that we're in right now, climate change*, you read about the Colorado River, and we're just a little drop in the bucket compared to them, but *those are the issues*. And maybe we're not as dire as they are, reading what I read, we're probably a little luckier. We have it maybe a little better. Our management is better, more ahead of the game than they are, I think, but more protected. *The compact challenges - this lawsuit that we have with Texas - even though you think that the lawsuit is a bad thing, it's probably a good thing to work out the issues with the drought.*
- Susie Downs: *It opens up in discussions like we're having today. And again, water is at the heart of the issues with everything. No matter whether you have too much of it. What do you do with it? You have too little of it. How do we get more? So we come to a table and start the discussions like this, and again, if the compact stuff hadn't happened, where would we be with our water issues? Would it be a lot better or would it be a lot worse?*

## Issues

*[Risks in negotiations]*

- Shayne Franzoy: *What if what if this is temporary, this climate that we're in. And [the rain] comes back and we did all of these policies and changes, and then here it comes, all this water and it just goes by. And then Texas is really happy.*

*[Watershed districts]*

- Susie Downs: *[New Mexico] is changing the wording [of the legislation] for the watershed districts. McClead is the smallest watershed district in the state of New Mexico with about six landowners. So having to get five board members out of six and the language also says that you have to live in that district. [The members of McClead] own the land, but they don't live there.*
- Shayne Franzoy: *so we're kind of up in the air. I guess you could say, grandfathered in because nobody else has ran. So we're just continually doing it. And I don't even know if it's legit or not, but we're gonna do it anyway because it affects our property.*

*[Greatest challenge are environmental impacts, as well as the corresponding farming expenses are high, to the point they can equal the value of the property]*

- Shayne Franzoy: *[what are our greatest challenges,] that is a good question. We have, as far as farming, the greatest challenge is just dealing with the environment. Our business is directly affected by environmental impacts, whether it be rains or hailstorms or drought or whatever. And so every year whenever we farm, a lot of these crops that we're producing right now, the expenses that we incur growing that crop are almost equal to the value of the property. So, in essence, we're one hail storm away from, losing the farm. And that is, really true. That's reality.*
- Susie Downs: *The biggest thing again, and I'm gonna reiterate what Shayne is saying. One is the environment, because as we all know, storms are intensifying. We have no control over that. And it can basically devastate you in one storm.*

*[Challenges]*

- Shayne Franzoy: *There's so many things that we can't control, and that's the hard part of it. Whether it be regulations or the minimum wage or the inflation that we're dealing with right now is a large part of it too, those are the challenges.*
- Susie Downs: *I commend you guys on the job that you do because I could not stand in your boots and do what you guys have done and continue to do, because on the regulatory part of it, the things that I see that y'all have to deal with, not just getting the crop in the ground, but getting it to market. I lose sleep over it and I don't even have to deal with it. The other part is the regulation. I don't know, policy and procedures. I don't know how you guys are doing it. This 1% [direct on-farm employment is 1.3% of employment] that's holding this country together with the food source. I don't know how much longer they're gonna be able to do it. And unless we step in and we start doing some kind of innovative stuff with our production, our water, our recharge, things like that.*

[Unfair trade]

- *Shayne Franzoy: The hard part is, the indirect effect of a lot of, what would you say, the unintended consequences of some of the regulations, regulations of contractors, the emissions regulations effects. Our biggest competitors across the border do not have the same regulations that we do. As far as, you could say, the EPA regulations, minimum wage workman's comp, there's so many. But at the same time, they're just right across the border. They could ship their produce or alfalfa across the border, with a lot less cost than what we have, and there's no fair trade, it's free. But, I was hoping that we could get some fair trade and that's, that's huge for us. Because, we have to compete with that, with this big old brick standing on our head and it makes it very difficult.*

[Challenges on McLead structure]

- *Shayne Franzoy: It's under [NRCS jurisdiction], but it isn't [managed by them], so it's like in limbo, so we don't really get the funding per se to do what we need to do. It gets a mil levy, but it's not enough to do the actual maintenance that is needed on the facility. Since I've been on the board, we've been saving up to do it. And we've done some things.*
- *Connie Maxwell: How about flooding in general as an issue, arroyo flows on the valley. I know EBID talks a lot about sediment and getting into the ditches. What are some of those challenges that you experience?*
- *Shayne Franzoy: The sediment we've removed, I don't know how much, I wish that we had kept records of it, but I don't know how many cubic yards of sediment we've removed from that facility. But we've removed a significant amount of sediment out of there. But every year it just keeps coming in. We removed a lot of vegetation and stuff, but this year we did have an overtop of the McClead. And I think, if we wouldn't have removed a lot of this sediment, and we removed a lot this year, we probably would've lost the dam. It would've failed, breached.*
- *Farmer 2: One of the issues I see, and I can't speak as well because I'm not on the board, but if it wasn't for Scotty and Shayne maintaining that dam. If someone else got on the board and it wasn't maintained how it should be without correct inspections and whatnot, would that have breached, if there wasn't somebody's proactive as Scotty and Shayne keeping that thing maintained themselves, if it was in the hands of someone else that wasn't as proactive, would it have been a pretty big disaster in the area for the, for that watershed, if it did breach. That's one of my concerns is if it went to somebody else and it wasn't maintained. As good as it has been the past 20 years or so, what could have happened and how big of a catastrophe that would've been in the area.*

[Challenges for dams and retention structures throughout valley]

- *Shayne Franzoy: The capacity of the structures aren't near what they used to be. And the storms are getting supposedly more severe than they have been.*
- *Connie Maxwell: And the infrastructure is aging.*
- *Susie Downs: And the infrastructure is really aging.*
- *Shayne Franzoy: Yeah.*
- *Susie Downs: And it's water, it's a watershed district. It's owned by these farmers*

and producers that are dealing with it. And kudos to Shayne and Scotty for doing what they do. *Whereas the flood control structure, Caballo oversees it because we're like the parent over the watershed district, so if the watershed district can't handle it, in essence, it comes to us. That's not a PL 566 dam. It wasn't built with NRCS funds. But in the same sense, it is still overseen by Dam Safety Bureau and the state engineer's office and it's on their radar. So anytime that there is something that happens with that structure, it automatically goes to the state engineer's office. The state engineer comes down once every five years and says, okay, I wanna look at this-and-this structure. And McClead, I'm sure was two years ago, was seen as a formal inspection from state engineer's office and there were some things they pointed out. It was nothing huge, clean up some, take some vegetation out, remove some sediment if you can. And their board has been very successful at doing that in the last two years. Now as just for general wear and tear and wind erosion and things like that, creasts get lower, they get higher, but when you go in to do stuff like that, everything has to go back to that state engineer, that design, and that's where we're having to rely heavily on the irrigation district [EBID] because they help repair it. We have their designs and things like that. Whereas on other structures in the Caballo district, we've got all of that. So, if Dam Safety Bureau comes down and says, Hey, this is a big thing, we need to address that right then because these structures are 50, 60, 70 years old. The majority of dams above [upstream from] McClead were built with PL566 money or Army Corps money. But PL566, they say after 50 years, the dam is outlived its usefulness, it's full of sediment, it did what it was supposed to do. Since NRCS funded structures were built with a 50 Year life span, after that period of time NRCS believed they no longer were responsible for the structure. But you can go back in and apply for watershed restoration money and things like that. But when you do that, you're not just meeting NRCS guidelines. You've got to meet the state engineers guidelines. And that's where it gets so cost-prohibitive. For a small [SWCD] district like us that only get a very small mill levy, we might bring in \$80,000 a year on our mill levy. That's gonna rent one piece of equipment, two pieces of equipment, and two guys for 30 days. And my money's gone. So you're having to go out to find federal money and things like that. And Shayne and the watershed district, they do get a higher rate assessment on their mill levy, but it's only for those members in there. So I think you guys are getting maybe \$3000 a year, right? So \$3000, you can't even take a shovel out there and take five buckets out.*

- Shayne Franzoy: right
- Connie Maxwell: *So what happens when the 50 years comes?*
- Susie Downs: *Tear it down, rebuild it, do your maintenance if you can on it to keep it from sedimenting up. Then also, we're dealing with another agency that states it's their minerals [BLM]. There's [also a BLM] permitting process that we have to go through, which can tie your hands for quite a while too. I can be sitting on money, I can be sitting on a pool of money, but if I can't get that permit and I can't get everything into place, it's not gonna do me any good.*
- *I'm going to use Garfield as the example. When I came to work for the district, they had applied and they were going to upsize the outlet pipe, and I want to say raise the dam a foot in height or something like that. By the time they got the NRCS studies done, figured out how much it was gonna cost, came to the district and it was \$700,000 that the district, at first it was \$300,000, and then it went to \$700,000. So, the district had to go out for capital outlays. So, we went and begged all of our legislators. The day I was hired for the district, we got the award for the final \$700,000 to move forward, we've got our match, we're gonna go with this. Exactly seven days later, the last NRCS report came through and said that the emergency spillway was highly erodible and they wanted to put roller compacted concrete on it. Our cost went to \$3.5 million. There's no way the district could come up with that 30% match. Scraped all of the work. We're now [at that point] 13 years into the process. Scrapped all of that work, all of that time. I then look through the fine print on our capital outlay request about sediment removal. And I was able to go back to capital outlay and say, okay, this is the situation. It's worded in here. Can we still use this money without having to give it back? And they're like, it's in there. So, I'm like brand new to the board and I'm begging the board, I don't want to give the money back. We gotta do something for them to let us put a project together to remove that sediment. We still didn't have enough money because of the spoil site where the sediment had to go because there was extenuating circumstances there. I had to go out for another capital outlay request,*

but since it was on their radar, basically I went in and said, please, I need this. And they're like, okay. *So, we were able to remove that sediment with that \$300,000 and get it back to the as-built that it was. And the goal of the district is to get every flood control structure that we have to sponsor, back to an as-built specification.*

*[Economics, costs in farming, farmers are aging and few youth are entering farming]*

- *Shayne Franzoy: One of the fears for the future and there's different ones, like this fallowing program that the ISC is doing, is it going to raise the cost of renting property that we don't own. Like we have some property that we rent and so we can't justify paying what the ISC is paying these guys to leave these fields fallow. So of course they're gonna do that because then they don't have to worry about maintaining their wells and and stuff like that. So that's one fear. Another fear is the cost of getting property, it's so high and it's pretty much there already that you can't do the cash flow of buying a farm. For new farmers, especially, who can't come in and pay \$20,000 an acre. With that you can't even net a profit, growing what we grow, diversified crops, unless you have lots of money just to go pay cash for it.*
- *Susie Downs: It's impossible for a young person to decide, okay, I'm going to be a farmer. And to be able to make it profitable, the amount of land that you have to have to get, that cost benefit ratio to be able to pay your farm expenses, you've got to have millions and millions of dollars.*
- *Farmer 2: Since I've been a kid, even as a kid you ask, if you are fortunate enough to afford a new tractor, what did that tractor cost and I remember the first brand new tractor my dad bought was a 1998 and I think he paid \$85,000 for that 8400. And he bought another one in 2008 and he paid around \$145,000 for that tractor. And right now I'm looking at some potential tractors and that contract now is worth half a million dollars. I'm talking about a 25 year span. And looking back at the old books, the markets haven't really caught up to the times of what our inputs are. And a lot of those reasons those tractors went high was EPA regulations that John Deere has to put in. But who do they put it on - is the farmer. That's why the price of that tractor is so much higher now, and we don't have control of it. We still have to buy equipment to farm. Whether you're agreeing or disagreeing with the regulations, they're here and we're paying for the cost of them. It's becoming riskier. And aside from that, labor, the minimum wage has gone up and all of us want to see people succeed and do well, but is it getting to the point to where it's not cost effective for us to do what we love. And speaking of the community that we all love, a lot of the people that since I was a kid have been working, you still see their faces, but now they're in their fifties, sixties, seventies, and you don't see any of the younger generation necessarily working here. Who knows what they're doing. I'm not gonna say some people are being lazy or taking unemployment, that's not right. But I'm just saying a lot of the labor that used to be here is going away, and now we're having to import it from other countries. Whereas it's not our choice that we want to, that's not what we want to do. We just want have a successful business. But it's just sad to see how the industry's changed just in the past 10 years since I've been working here. And it changes drastically every year. It's not just small changes. It's just on an incline to where I don't know where it's going to go.*

- *Susie Downs: I'm gonna plug onto what Farmer 2 is saying again, the younger generation, they don't wanna work that hard. They honestly don't. They have seen when grandpa and grandma's land boomed We're doing great with it. Passed down to Mom and Dad. Mom and Dad are working and they're working seven days a week, 23 hours a day, and we don't wanna work that hard. We don't. Why are we killing ourselves for the passion that they have? That's not our passion. We're gonna move on to a different field, and that's where we're losing our young farmers and ranchers, even though that passion may be there. I've got a 24-year-old that would give everything he had to be a farmer, because that's all he's ever wanted to do. But again, in that beginning for a farmer and rancher, he doesn't have billions of dollars to go buy the land to get started. So what does he choose to do? He chooses to work in the ag business, he's still out there doing it, but he's just not on the tractor playing in the dirt like he would want to be, and that's where these younger generations are moving away from. They may still be in the agricultural field, but they're not the boots on the ground. There's still a very high component of it, but it comes back to our producers that are on the ground that it's that dollar. You've got to be able to justify that expense due to the regulatory to be able to keep moving forward.*
- *Farmer 2: And another thing, I think there was a study, the average age of a farmer, as of right now, I think is upward, above 60 years old. And that just goes to show there's just not a lot of people in my generation and even in the generation above me that are still farming. It's just increasingly getting smaller. Doesn't necessarily concern me individually, but it concerns me as the country, what's agriculture going to be?*
- *Connie Maxwell: What do you think what is needed to help support farmers to maintain, at not only the system that you want, but a viable system?*
- *Shayne Franzoy: I think the problem with bringing new people in, you almost have to grow up in it. Because it is difficult. You have some people think that we just go out there and we throw seed in the ground and we come back nine months later and we harvest it and get the rewards. It's just very difficult. You can't get people. My grandfather used to call [farmers] educated idiots. There's so much risk in farming that anybody that has any sense wouldn't do it. Because, any year you're putting it all your chips on the table. Every year. It almost has to be something that you grow up with, that you that you experienced, you watched it, to see that you can make it work, but it takes hard work and you don't vacation from March to October, you gotta be on the farm every day. And you have to have your whole heart and soul into it. And the people that you do get usually you don't last very long. So it's very difficult to bring somebody that doesn't have that experience that grew up with it to come in and do it.*

## Strategies

*[The need for education of the greater public and the regulatory agencies on actual farmer challenges]*

- *Susie Downs: It comes back to that one word, education, education, education, because the majority of our population is urban. You run to Walmart, you pull it off the shelf, milk comes in a plastic jug, and if Walmart doesn't have it I don't know about it. You get your can of green beans. How did that green bean get in the can? It wasn't that it came from another store and it got there. No, you had to get that green bean, somebody had to start with that seed and a piece of fertile soil and grow it. We have to educate our public. We're blessed because we live in that ag community. We see it, we breathe it, we eat it every day. I think if more of our urban young adults, young students, could experience that we might be able to foster the inspiration to say, okay, can I intern for a summer on a farm? I knew nothing about cattle, we had cows, we fed, we butchered him, we ate him. My brother was working on a huge ranch in Oregon. I spent the whole summer on the ranch and became very appreciative of when I had that piece of hamburger on my plate.*
- *Susie Downs: So into the good and the bad of it, you have the urban, you have the regulatory side over here that says, this is a really good idea because we need to make sure that our food is healthy, that X, Y, and Z is happening, but they're eating their porterhouse steaks, and in the same turn, they're badmouthing the feed lot that it's being grown on because it's cruel and unusual punishment to this animal. But they're not looking at trying to merge these ideas together to get it in line. And I think it would be beneficial if education could address components like that.*

*[Approaches need to be fit to climatic region]*

- *Susie Downs: You have to be in the geographic area where we're at. We are in the desert, the Southwest. You have to basically grow what you can produce in this arid environment. NRCS has a huge incentive about no-till cultivation. It does not work here because we don't have the moisture. It's a great concept. If you've got someplace where you have the soil moisture that can break it down and build the healthy soil, it just doesn't work here.* We define what works best for our producers in this climate, so again, like Shane's was saying, if we could find a low water-use plant out there, that would be great. But is that actually going to work here?
- [Longer term McLead restoration approach to slow and capture flood waters]
- *Connie Maxwell: And one of the things that we've been talking about, all of us together is really starting to look at things from a watershed perspective*
- *Susie Downs: from the top down.*
- *Connie Maxwell: Yeah. And when we met, we were thinking of submitting this to a particular proposal but BLM was really concerned about their workload. And so we realized that, if we look at this watershed from a watershed perspective, it's a huge watershed. You've obviously got the Little Caballos, and a lot of energy coming down. We realized we really would need to go upstream, and we started to look at the opportunity [see priority project 'McLead']. And when you guys do this work [at the structure], we were going to try to see if you could do it to where you're removing sediment and you're terracing it just a little bit, just give you an indication of what that might be in there in terms of terracing, find an ideal spot for that divide that you guys are talking about, adding the berm so when you remove the sediment, you can put some there of course, and the rest of the sediment you'd be able to spread on your fields.*
- *Susie Downs: I think he was saying six inches across the field to a possibly a foot in depth, depending on the sediment, because, we can't, in no way, shape or form do we want to deepen the structure because then it won't flow out and we end up with the problem that we have where you can't get in there and do anything with it.*
- *Shayne Franzoy: The state engineer won't let you store any anyway. It has to go out. It's got to flow out.*
- *Connie Maxwell: within 96 hours. One of the things we were talking about was settling out the sediment out before it gets into the EBID supply ditches, also helping other farmers if they wanted to spread the water on their fields. This is long term, this is a wish goal. If throughout the entire valley we could settle out enough sediment that lots of farmers could actually use that water on their fields, then we could really increase the amount of aquifer recharge. And so we [in another meeting about McLead] started to play with the idea of okay, let's not compromise on this. Let's not create anything that could blow out. What if we put another small passive sediment pond downstream?*
- *Shayne Franzoy: They're working on that, like the state engineer and EBID, I know that there's talk out there about capturing flood waters. I don't know how you capture it, store it down in the valley, and distribute it. In my opinion, it would be better to capture it before it gets to the valley and that way you can let gravity*

control it. Because if you have, like ponding areas below like discussed, then you're gonna have to use energy to maybe pump it out and put it into the infrastructure, EBID's infrastructure. So maybe that would be a way, and because one of the issues about the McClead does drain into EBID'S infrastructure. *But at that time, everybody's flooded, so they don't really need the water at that time. So you need to be able to store it for future use that might be a week later, or two weeks later then.* When the event happened. So that's one thing to take into consideration.

- *Connie Maxwell: We will revise these plans for the overall watershed, which can be a bit of a model for what we should be doing throughout the region, but we'll also focus on the immediate needs.*
- *Shayne Franzoy: These plans that we're talking about involve the whole watershed and maybe starting at the beginning, right? I really think that's probably the process that should be made. It should be start at the beginning and work down. And because I don't think it could work if you start at the bottom. Help on the top because then it might destroy all the work that you did on the bottom with one flood.*

#### *[Watershed plans]*

- *Susie Downs: The good thing about the research and planning that Connie's doing and the information that's going into this plan, the farmer's perspectives that are going into the plans, once this plan is developed it's a living document, and when it comes into funding opportunities, we can say - look, all of this has been done.* We've got it here. So that helps on that funding aspect that we're not having to go out and say, okay, now we're going over here and we want to look into the upper watershed, and now we have to plan all this stuff. Right there. That component is done.
- *Connie Maxwell: And like you said, it's a living document. We can always say, you know what? I learned something.*
- *Susie Downs: This worked, but that didn't.*
- *Connie Maxwell: Let's change it. Here's a better idea. It gives us the ability to talk about it.*

#### *[Cisterns and storage]*

- *Connie Maxwell: What about cisterns? Do you think that would help at all?* Little water towers. If you could get the flood water to be something that you think you'd be able to use, is that something that you'd be interested in? *The idea is to try to do a couple of different things. If you could bounce water onto the floodplains upstream, then you can settle out some of that sediment.* So if we saw that as a serious filtering area, and then let's say there was not a deep, big pond, more like a settling pond that wasn't meant to stay full. And then you would get it from the settling pond into the cistern.
- *Shayne Franzoy: There would be an interest to that.* You know what I'm just thinking, because I'm not you like an engineer or anything like that. But my thing is, *if you do something like this*, and I'm looking like a hundred years, 200 years down into the future, and *these things are gonna catch sediment at some point.* *The elevation is gonna increase, you're gonna have to do something with that sediment, don't you think?*
- *Connie Maxwell: The way that this sort of stuff is meant to work is that you also combine it with watershed restoration and filtering upstream.* So you're not filling these quiet as quickly as one normally would. But the second thing you're trying to do is actually encourage vegetation in these upstream floodplain areas. You actually want some of that sediment buildup so that you have nutrients for vegetation.
- *Shayne Franzoy: And the only issue I have with vegetation is our water in this valley is already over appropriated.* So if we create these environments with all this vegetation, cottonwood trees, it's gonna be competing for the same water that we're trying to conserve, to be able to utilize on the farm.
- *Farmer 2: One of the problems I see with vegetation too is if the vegetation gets established and then there's a hundred-year flood, what if the vegetation that comes down plugs the outflow.*
- *Susie Downs: Vegetation wise, we think vegetation, we think mesquites, cottonwood trees, things like that. Vegetation wise, here we're thinking grasses and forbes and things like that, that will open that up and let it, infiltrate in there.*
- *Shayne Franzoy: It's more of a vegetation to hold for erosion purposes*
- *Connie Maxwell: Yes, exactly. To hold it and filter, that sort of thing.*
- *Susie Downs: We're not looking at a big riparian area. And if you have vegetation in those little terraced areas too, it's gonna slow that water down a little more and let it settle some more of that sediment out.*

The thing is, like we're saying, we need to start at the top down, not the bottom up.

- Shayne Franzoy: Right.
- *Susie Downs*: But we're gonna have to come up with a happy medium. And right now it's looking it's better to do it from the bottom up because of the policies and the regulations that we're having to work with. And like Connie said, it's not today, it's not tomorrow, it's not five years from now. But we're having to look out farther than that because *we want our young farmer's kids and grandkids to be able to still be able to farm their grandfather's land. And we want that water source to be there. We want to try and get as much as we can back into the aquifer, because we all know what happens when we start pumping, right? We're not getting it coming back in, so we're gonna have to do things like this.*
- *Shayne Franzoy*: No, we do. If we utilize the flood water, it's not as much as we think it, it seems like it's a lot of water, but it, in all reality, it's not a whole lot of water, but, if we could put that stuff to beneficial use in our area and help with our aquifers and stuff that little bit would help.

*[Additional sources of water are needed because Ag is taking the hit in water conflicts and it puts the community's future on hold]*

- *Shayne Franzoy*: Because, I know, that along with other things, I'm hoping that the cities start importing water from other aquifers into the area and stuff too. In all reality, like the Gila River, we had an opportunity to get water from the Gila River and we lost it. It's gone now, and understanding that nobody wanted to change any of the Gila wild and stuff, and I didn't either. But at the same time, you're like, holy cow. It wasn't a lot of water, neither is this that we're talking about either. But if we could have somehow drill the hole across the Black Range and got some of that water or something, I think it would help. But we do need to import some water. *I know, we have the Tularosa basin, the water across there that maybe they could put a desal plant and bring it across, four municipalities, it would be great.* I think we do need to figure out how to import some water into the area *because agriculture needs to stop taking the hit on this over-appropriation, I've just seen studies to where during the drought of the fifties and the drought now, agriculture usage is almost the same. The only thing that's changed is there's more people, cities taking the water.* I hate agriculture to take the hit because *you're slowly gonna start taking agriculture out of the picture, and there's more than just, me and my kids and grandkids, futures on hold. It's other people, businesses, that sell to us, supplies and fertilizers and tractors.*
- *Susie Downs*: And different things too. It's the whole dollar meet seven, it affects everything. Every industry that's out there from petroleum to the food on the table.
- Connie Maxwell: and communities
- *Susie Downs*: and the community.
- *Shayne Franzoy*: You're right. Which is the big thing.

*[Incentives for low-water use crops, needed change to water law, crops need to be economically viable]*

- *Connie Maxwell: What about super low water-use crops to keep fields in cultivation? If you're gonna fallow or hold back cultivation - I just don't have enough water for this field over here is and getting into new crops is of course is a big deal. What about ideas of groups of young farmers that need land that say, "Hey I'll take care of your field, I'll use a 10th of the water". Are there any innovative ideas like that? First just what do you think about help with low water use crops and second, can you imagine coming up with kind of a strategy to address?*
- *Shayne Franzoy: One issue that we have, that we are gonna have to change, like you talked about, using these crops that use less water, like in my business, it's all about return on investment, right? But the way that our state law is written is the whoever uses the most water gets rewarded. That determines that your water rights. We've talked about this, I'm on another water board that's involved with the lawsuit in Texas and adjudication. But the people that use the most water are the ones that get rewarded and the people that conserve don't. They lose. So you'd have to have some kind of mechanism in there to where by using less water, you're not getting penalized by losing that water. It would have to be something like maybe the water you can conserve, you can sell [or waterbank] possibly. And without losing that water down the road. Because we've talked about that in the adjudication and other things when we were talking with the ISC about the fallowing program, which that actually started with the state engineer. They just used the ISC to manage it because of bureaucracy or some other issue. But we talked about that as maybe having something like what you're talking about to where farmers have an incentive to conserve a certain amount of water, they could put it into that program. But it never materialized.*
- *Farmer 2: If there were crops out there right now that could be a good return on investment and less water, I think you'd be seeing those crops.*
- *Shayne Franzoy: That's what we talked about too. Like if, instead of growing alfalfa, if there was an incentive program to grow cotton instead of alfalfa. But then, you get to that point, so then you're gonna have to have some sort of tax on water usage to pay these guys. And we're not in a conservation district, we're in a reclamation irrigation district. There's a lot of difficulty in getting that established too, to tax for that to generate that income to pay somebody to do that. So it's complicated. I don't know where I heard where it was, but there was even a program to where, like if the farmer had alfalfa, where they would only water it and cut the first two cuts and then they wouldn't water it again after that. Because the first two cuts, you get more money on it. But then they were paid a certain amount of money to not water it anymore after that. You could do that. It's just how do you manage it, or where does the money come from and where's the entity that's gonna manage it? How do you enforce it, what's gonna manage it effectively and enforce it? All of that stuff.*
- *Connie Maxwell: Have you heard of any crops that people have been interested in? I think there's a barley program that NMSU has been doing research on. Have you heard of any farmers talking about any changes to crops to lower water use?*
- *Shayne Franzoy: I haven't. I think anytime farmers are cautious on stuff like that. A story that I'll tell with that. I was reading in this article to where there was a big grocery chain that wanted these farmers to participate in like a carbon neutral program to, to where these farms do things to eliminate or to minimize their carbon footprint. And they're gonna do composting and no-till and all of this stuff. And and this farmer was doing this presentation, and then one of the Kroger people says at what point would you get to where don't have to charge for those expenses? And the farmer says you're never gonna get to that point. We get hit at these angles with a lot of our customers and stuff want us to do. Food safety was one thing that started like in the late nineties. And then at the end of the deal, how much more are you gonna pay us for our product if we do these steps? And no, that's not how this works to sell us your product. You gotta jump through all these hoops. And so we farmers are very cautious when it comes to, Hey, we're gonna do this program for you. And then you have, you can drive to Deming and you have 150 truckloads a day of alfalfa coming across from Mexico. How are you gonna compete with that?*
- *Shayne Franzoy: And I think farmers are always interested in, like going back to your point about growing low water impact crops, there would be an interest to it, if it was economically feasible to do. And but some of this stuff, like ideas that are out, even though it's just like the hemp, yeah. And there was supposed to use this as much water and here you can make all this money on hemp. And that lasted for not even six*

months. Yeah. And it was, and then it like there is no market for hemp or anything like that. That's another reason why we're cautious

*[Strategies to address economics and profitability]*

- *Shayne Franzoy: In fact we're in the process of transitioning to organic on one of our farms and doing the numbers in order to get the return on investment, and in our opinion, we gotta have vegetables in there. And like the barley would be something that you'd think that would fit in there, but barley is not going to benefit us because it's extracting nutrients from the soil instead of building the soil for our vegetables. But if you're a farmer in Iowa, or it rains a lot and or you're doing dryland farming, you can justify that because you're not spending all this money on putting water right on there. So there's just some things that are not realistic to do. Our organic fields are an experiment. It's something that I've done some research on in the past and we've been thinking about it, and what we've been trying to address with the issues that we deal with in this valley with the drought and pumping water is how can we get more return on our investment without planting pecan trees. And we want to experiment with this and see what the cost of doing organic grown chilies and onion is. And if it can be done right battling all the pests that we have, to battle weeds and insects.*

*[Crop transitions could work, but need to address significant challenges]*

- *Connie Maxwell: [during discussion of difficulties for young farmers] What about ideas to address issues that arise if there's gonna be a lot of land that's not cultivated? For example, if there were young farmers that could come together as a cooperative and work with a group of farmers to say, you know what, I'll come and I'll work with you and I'll, in essence, rent some of your land that you were planning on not cultivating to begin with. I can plant some herbs, I've got a market, I can make infusions, I can sell them in bars, I can make different New Mexico branded bitters, something like that. And say, the ISC program agrees if there's only 1/10th of the amount of water going on, then you can still participate in that in some capacity. Are there those kinds of ideas that might work?*
- *Shayne Franzoy: And I think they would, you may get there if you could find first the market and come up with the price and these farmers can see what the inputs could do. And I've done stuff like that in the past. I grew canola one time because this company was not the company, somebody with the university had a grant, I think with the university to make biofuel out of it. But, when we grew a little bit and we tried it out, just like growing canola here and growing canola where they dryland farm is, the costs are just two different things. The cost need to include when you're farming in this area, the cost of water and energy to get that water to the fields plus the cost of the real estate and paying rent and all that stuff. You have to have pretty good returns to make it work. And then you have farmers like myself and my son that are multi-generation, that grew up growing chilies and onions. And that's what we know how to grow and what we're feel comfortable with doing. To change it'd have to be well worth it, the return on investment would have to be worth it. And depending on how much you get for that product, plus, the water savings that you would get, would just have to depend on economics. That's what it is.*

It's like the water board I've been on, I'm on the diversified farmers board, and I've been on there since I think 2009. Since I got on there, the amount of acreage of alfalfa has changed significantly. And I don't know what the acres was then and now, but I bet you alfalfa is half of what it was. Because, and it's all economics, pecans have gone up. At the time I think there was 25,000 acres of pecans in the New Mexico side of the Rio Grande Valley. I would bet that's closer to 40,000 now. But then it's mainly the economic driven. Cotton, the cost of your return on investment on cotton is higher than it is on alfalfa. At the moment. Tomorrow that could change.

*[Small experiments are possible]*

- *Susie Downs: So here we're looking at initiatives and incentives to try and start doing low water-use crops and practices. Say Farmer 2's kids - it is hard for a young person to say, I wanna be a farmer. Because some people they've been around it and they don't want to have any part of it. Shayne's lucky, his son chose, he wanted to come back and do the family farm. What if you started with a younger generation - since I'm 4H background and always wanting to educate children on stuff - what if you grabbed one of your grandkids and said, "Here's a half acre on the farm, what can you do with it? And prove to me lower water use, productivity. Show me what you can make on that half acre. Or an acre." Would pulling that acre of your production out of the farm affect your farm?*
- *Shayne Franzoy: No, it just depends on how large you're on my farm. It probably wouldn't hurt. And it's just like our organic experiment that we're doing. It's a small enough amount to where if it didn't produce anything, it's not gonna hurt too much. We can absorb it. But you go to some of these farmers and you present this, they're gonna be like,*
- *Susie Downs: "What are you talking about?"*
- *Shayne Franzoy: Exactly, and that's what I'm thinking. But you have some, of course very few if that, would be interested in in doing something like that, because growing chile and onions, that's what we know. That's what we like to do. Most of us, we don't,*
- *Susie Downs: You don't wanna mess with the system*
- *Shayne Franzoy: that's working and you don't do it. A lot of it what you do is because that's what you want to do. We want to grow onions. Or cotton or chile. We could go plant lettuce maybe and make more money. But we don't like growing lettuce. We like growing onions. This is our rhythm, what we like to do.*
- *Susie Downs: Going to a different crop, you're again looking at all kinds of other expenses that you're going to incur with that crop. You're either gonna have to contract out somebody, right here on the corner here. Or you're gonna have to purchase that equipment, so that drives your cost up. To branch out into a new crop.*
- *Farmer 2: And if it fails, then you have to find out how to get rid of that equipment. There's just a lot of factors.*
- *[after discussions of needing to pair crops with the climatic region] Connie Maxwell: One of the things that we have been thinking about is this idea different farmers that could come together in different parts of New Mexico and do a New Mexico brand. Things like bitters are becoming really popular now, you can do them as, part of your cocktail or you can do them as a non-alcoholic. In places like in Europe, different communities had different types of amaros and infusions, different ecologies different kinds of herb or vegetables. And that might be a way if you can actually develop a market, you could probably get New Mexico branding involved in it. Its at early stages, but it's something we're gonna try and see if we can come up with an approach where if you're gonna fallow land, let's try to pair a program like that and make that land accessible to a group of young farmers that might wanna try that. And I love the idea of pairing that with 4H. It's all very risky.*
- *Susie Downs: Not just 4H it's any youth organization out there that's right might be willing, that we can educate them on the ag. Again, educate those urban onto an ag-based system so they can learn about how important this all is.*

*[Fair trade]*

- *Shayne Franzoy: If they put armed guards at the border and stop those trucks and say, all right, here, you gotta pay a fair tax because you don't have the same regulations as this American farmer. That would help a lot.*

- *Farmer 2: It would. That would help a lot.*
- Susie Downs: Would tremendously help, and it would impact everything. It would impact the prices of fertilizer. It would impact your prices of seed. It would impact the fuel, the cost of the machinery, to the food, all the way up the food chain.
- Shayne Franzoy: John Deere still makes tractors that don't have all the smog stuff that they can sell it to China and Mexico. And they half the cost of what we have to pay for a tractor.
- Susie Downs: And heaven forbid, if you wanna use great grandpa's little tricycle tractor to go farm a half acre a land.

[End of summary]



The following is edited and reordered for conciseness and clarity. All items in *italics* are summary points that are included in this Plan's Section 2 *Regional Values, Issues, Strategies, and Visions for the Future*.

#### Value about the area / Visions for the Future

- As bad and *as dry as this country gets, we can always manage to make a living on it*. When this country is in its worst shape, and maybe it's due to the amount of cattle BLM lets us run, we're always able to chisel a living out of it. We drop our numbers, increase them sometimes, but it's a big enough ranch and it produces enough feed that we can always, always manage to take care of our cattle.
- *We had a good year. There's grass everywhere*. Looks good.  
*First priority is our livestock*.
- And that's our main deal is the livestock. You can look at it from any point of view you want, but *the bottom line is we're raising cattle to make a living*. And so the better it is for the cattle, the better it is for us.
- If we do anything it's for our cattle.
- We got here in, I'm gonna say, 84. We were glad to be here. We came from a place that was way drier. Then we got to see what the desert was all about, it's rough. This year we've grown more feed, but just because of the way the rain came right
- For us, I can't speak for other ranches. *We have more grass this year. I believe this ranch is better than it's ever been this year. Just because of the way the rain fell. It came at the right time, and we had a lot of slow rains*. And just, really, we had some good water running rains that filled our dirt tanks and water ponds and stuff. They're all full right now. And we had some slow rains that really were good for the grass. God, we've got grass in areas. It's just unbelievable this year. [The timing was great] for us. At first we got an early rain and I was like, oh man, they say early rains are bad. That means it's gonna dry up and we're not gonna get it. And it just kept coming. It was really good.  
*Have not seen areas with a general decline in grass*
- [Connie Maxwell: Have you seen areas with a general decline in grass?] No, not really. *The grass has maintained itself*. This ranch always has good grass. And I mean, we've had some dry years where we're like, oh, we had to move some cattle. We had to feed more than normal. But when we finally had a good year when the rain came around, it always just picks back up.  
*[Drought effects]*
- *We don't ever get to where we have nothing. We definitely get to where it's hard*. We have had some years where some of our old cows, you see them and you're

## ADDENDUM IV) RANCHER: GENE ALLEY TRANSCRIPT

like, wow, I can't take her to the pens. She's too weak. Or, she's just not gonna make it this year. And that happens. At that point she's lived her life and she doesn't owe us a damn thing, let her die in peace out here, and our young cattle always do good. But we just always have that handful of old cows that can't make it through the winter, but *we've never been so desolate that we have to vacate. Through supplemental feed we always maintain to stay in business.*

- *I think this area is real stable.* I know all my neighbors and have good relations with them and we all complain about not getting enough rain. *We all complain* about the grass getting tough. We all complain about having to buy supplemental feeds, *but we're all still here. Very few ranches have changed hands. We all work together. We get along great and we all work together and help each other out.* It's a good area. It really is.
- [Our neighbors] get cattle on us and we always push 'em back and fix the fence. I know that they get cattle on me and I get cattle on them. And there's never been that animosity where, hey, you pushed some cattle back and we're missing a calf or vice versa. We always have a good relationship. They call me from time to time, everybody tends to, we're all in the same business. We're all shooting for this, we're all trying to make a living out here. It's working for us.
- [Connie Maxwell: If you built a well [at the dirt tank viewed], how deep do you think it would be the ground water?]
- *[Aquifers and water quality:]* I don't know. See this, that water storage across there? That's what, a mile maybe? Maybe a little more than a mile. Water there, I think that well is 285 feet if my brain's working right, and I think we're pumping from 150. Pretty shallow water right there. *This ranch has shallow water all over.* All my neighbors have 700, 900 foot holes and my deepest, tallest is 360. And we've got one up in the mountains that we pump from 90 feet. 90 feet. It is the *coldest best water you've ever tasted. It's so soft.* You can put a speck of soap on your hand and it just really suds up.
- We do have a spring, but it's up in the mountains. And it might be running now. It had been dry for a while. *There's one place in this basin* that I could [take you, but it would] be hard to get to. We'd almost have to go horseback. It's not far off of the road. But I'd have to find it with a horse and then take somebody in there. And there's a big rock. It's a huge arroyo. It runs a lot of water, I mean, it's deep. And you gotta talk about the water that gets in here. It's probably one of the biggest. It runs down through the Barbee draw system. On the other side. And there is an outcropping of rocks and *after the rains it'll hold water. Water just stands there for six months.* [Connie Maxwell: Is it caliche layer, you think?] No, it's all red rock and red dirt.
- *Our water's not too salty here.* We've got pretty good water. *We've got really good water. And in a real dry year, our water wells are what save us.* We have really good water wells on this ranch.

*[BLM animal units:]*

- We've got the feed. These ranchers could run a lot more cattle than we run on them. *You're restrained by the BLM, their animal units, which is great. It works out. That's the reason we're never out of grass. People would overstock in a good year and then they'd be in trouble. And then once you hurt one of these ranches like that, it's hard for it to come back.* Unless you just vacate it. And when you eat the grass to the ground and vacate, that's when your brush takes over. So it's a happy medium.

*The cattle self-disperse. Management strategy is to gather and push cattle when branding or talking calves off.*

*Benefits to cutting pasture in half*

- We've gathered and pushed cattle 16 miles on this ranch. From the headquarters all the way around. The point of rocks mountains, back, and we'll push cattle back in this corner, into this trap and then back to the pins is about 15, 16 miles. I would love to cut this pasture in half. Make it smaller. I'm getting older, make it easier on me. We only do it when we're branding our calves or taking the calves off of the cows to ship them. Other than that *[the cattle] self disperse and they know this ranch, they know where they need to be.* You know what's funny is when it rains, those cattle that are at the ranch house, it'll rain and they'll just be gone one day. And I'm like, that tank over there must have filled up. How do they know that? And they just in a big line headed to a different portion of the ranch and you go over there and the retention pond is full. They know what they're doing.

*Cow calf operation is the dominant strategy, but take them to 600-700 pounds on a ranch in South Texas.*

- Pretty much out here. Very few yearling leases out here, I don't even know of any in the area. We ship

our cattle to South Texas most of the time, we have big farms down there that we run our cattle on wheat or sudan grass, these big circles. Then we sell right off of that to a satellite, superior satellite services. And a lot of people don't do that. A lot of people gather their calves, ween them, go straight to the cell barn, whatever that brings, is what they got to work with that year. We don't finish them, but we take them to, *we try to take them to six, 700 pounds*. And then, coming off of those conditions, the cattle look really good, they sell really well for it. However, last year they were droughted out down there, so last year we sold everything to cell barn.

*Trigger gate technology to gather cattle*

- We gather once a year and a lot of our gatherings are done on a lot of different areas. We don't do like a lot of people do, we use some trigger gate technology that a lot of people don't use, a lot of people frown on, but it works for us. So like every place these cattle can water, with the exception of this trap - this is a trap, it's a real narrow trap that goes through those pens and we gather it fairly easy. But like all of our water has pens around, cows have to drink water, and we build these funnel gates that are like this and the cows, they're spring loaded and they go through to drink water and they get used to it. It just rubs them on the side, doesn't hurt them. And then there's another set of gates beside it where they go out. When we want to gather our cattle, we just close the ones going out. We can only go in. You just shut them one day and come back, the next thing there's 150 heads standing there looking at you. Nobody got hurt. It just happened. [Connie Maxwell: And why do people not like it?] Because everybody wants to play that tough western cowboy, we gotta get on a horse and just punch it out. [They think it is] too simple. Works for us. It doesn't work for us on all of them, but I've got some cows that'll stand outside and just say, no, I'll die before I go in there. There's those, yeah. We do plenty of the real cowboy stuff too. I've got some really wild cows.

*History in the land, Spanish blacksmithing remnants, likely along the Jornada del Muerto trail, tough people along areas with little water truly exploring*

- We find old roads, gosh, it's crazy. We've been here 30 something years and we'll be riding out through the dense brush land, looking for cattle or something horsebacking and feel stuck and look, wow, this is an old wagon road. And you can see the two track. And so I just gotta look out for stuff all the time. I gotta ride my horse up and down those roads looking, you can't believe what you will see, old medicine bottles. I'm like, man, this is really an old road. It was used quite a bit. We've some places where the Spaniards stopped and their blacksmith worked on stuff. Just everything they did was forged. And they're just metal pinchings and metal shards just all over the ground. I saw a hitch for a latch that went to one of their harnesses or something. It's all hammer forged. And it's a perfect figure like an "S", but makes a perfect figure eight, pinched on the ends. How could that have been done back in the 1,500s or whenever it was? They were through here. If it was our cheap metal, like this stuff we made, it would've already rotted to nothing. And that thing is still shiny in some places where the

hammer hit, struck it. It is really neat. I saw a Spanish spur. Their boots must have been really square in the back. And it had the chain that went underneath it, the heel chain. Every little link was hammer forged and pinched off. Unbelievable. To be able to hold it and go wow. I dunno when that guy traveled through this country, but it was a long, long time ago.

- I was in this pasture, this narrow pasture that just runs back to the pen in the bottom. I think there's 690 acres, there's a big piece that's private land, right in the bottom of this main arroyo. I think the Jornada [trail] runs right through it. Or had to be, if the Jornada is right here somewhere. We gotta be in it pretty much [where we were standing].
- That is where they stopped and worked on stuff. And it's just an outcropping of metal, it's just crazy. I mean, they must have camped there and worked on stuff for a long time. That, or they left, maybe there were more coming, and they was like, "all right, you're the blacksmith and when those people get here, you work on everything that they have that's broke." Where did they get the steel stock from? Did they haul it with them? I mean, they must just have said, "Okay, we're going to, who knows where, we gotta have a certain amount of metal, because we're gonna have to have horseshoes, bridal pieces, buckles, and when you get to this spot, that guy's gonna fix everything that's broke. Who knows? It's amazing. What was their train of thought then? *They had to have been some tough people. You know what? To just come through this country, no water, no solar pumps.* What were they doing? *I mean, I'd hate to have to go through this place just say I can't drink water till I get to Hidden, I can't drink water until I get to the McClead. And I know where it's at, they didn't have none of that. They didn't even have directions, they didn't have a clue where they, they were truly exploring.*

## Issues

*[Generally high energy flows causing erosion biggest issues]*

- [Connie Maxwell: areas of erosion, flashy storms, sediment moving biggest issues?] I do believe. And *the more water we can retain and more water we have for livestock, the less runs downstream. And if you can disperse it and use it to irrigate the land better. Slow it up and spread it as opposed to letting it build bigger channels.*

*[Need easier accessibility and less of a paper trail to help address issues]*

- [For ranchers in this region, are their issues are similar in terms of erosion and flashy storms and things like that?] I think so, I think easier accessibility to help, like we've talked about. I think that's why I haven't reached out to the USDA or the BLM for assistance because it's just such a big dang paper trail and we've gotta do a survey and we've gotta do this and we've gotta that. And it turns into what you wanted to happen, a quick project turns into two or three years down the road. And we got no time for that. We gotta go.
- I'll give you an example right now where the telephone building is right there. Before you get to our pens. There's electricity there. This ranch has zero electricity on it. We're trying to move power three quarters of a mile to my private land. We know it's gonna be expensive through the electric company. But they just did the archeological survey for this road and this power line would come right down that same road, where the survey was right to the inside of the fence line, which I think they, they did the archeological survey on that was like 80 or 90 feet wide down the roadway. It would be easy to say there's already been a survey done. Nothing else historically has been done since that road has been put in. They want to do another survey. What's the point? I don't get it.
- And I think *the ability to work with these [agencies]* - the BLM, the government - easier, *would make it better for all of us in the future.* And for us not to feel like, every time we allow them to do something, they're gonna take that land away from us, they're gonna fence it out. They've already done it on one portion over here, when they were doing that Toby Hole deal that they've never finished. I don't know what they're doing over there. I said we use that tank, our cows water there. You build a fence around it, but I want the cows to have access.

*[High energy flows in upper watershed, upstream from large dykes intended to protect the railway]*

- *The large dykes are all either breached or silted full. You could put them back to like they were day one and get a big flood and they'd wash them all out.* That can't be good for the railroad where it runs under it and washes up against it. as far as dispersing the water, in different areas, like the water that comes outta here, if you were gonna try to slow that down. I just don't know how you would, because I've seen it come outta there. I've seen it tear this highway they built up.
- ... Be neat to go in there and look at it and just see how we thought it was originally designed and maybe put it back in place one time and just see how it does work.

*High energy flows upstream from spaceport highway from Point of Rocks*

- Just last year they had to come and pull the fence on the east side back up out of the mud and reconstruct it because *the silt that loaded off of the Point of Rocks mountains was so much that it silted all the way up to the top wire.* And I've seen it come through here *three, four foot deep.* And you can see the damage it does to the, it's eating the road out in several places. [The silt] will cover the road. They have to come and blade it off with the road grader.
- When this was a dirt road, every time it rained, just depending on where it tore it up was how far you could go. Before the people that lived that way would either have to go to TorC around, through Engle. You were landlocked.

*Flooding compromises fencing, cattle are able to escape, but county does not compensate*

- And the cows were just walking across the buried fence, getting on the road here. And we had a couple of them killed. Didn't get nothing back on those. Nobody wants to claim responsibility. There's a dead animal out there that if you call the state, they tell you call the county. If you call the county, they tell you to call the state. It's still a fence out state, it's just killed on that right of way. Whoever owns that right of way should pay for it, the County.

*Intense storms result in erosion along the road ways, and road maintenance digging the road deeper instead of providing turnouts for the flow exacerbates the problem*

- Intense storms: *we see that the instead of controlling the water, we just fix the road where it crosses in all those waterways.* That's where I notice it mostly. It's where we cross roads, they just get deeper and any road here is deeper than it used to be, because here we don't build roads. We just build creek beds. Throw the dirt out of the road, don't throw dirt back in the road. We throw it out, push it out to the side, and keep doing that and pretty quick, you're driving in a tunnel. A lot of our road crossings are just deeper than they used to be. Bigger. And that's all because of that.
- [Connie Maxwell: One of the big strategies for restoration and slowing things down and keeping the water up in the watershed is, where you can, do turnouts on the roads so that you're not, like you said, creating a channel bed.]
- They build a lot of channels in New Mexico.

*[Vandalizing is a bit of an issue, but not too much erosion from ATVs on this ranch]*

- We have had some vandalizing done. I've had some things, usually it's kids out messing around on these side by side, shooting stuff up and things like that.

We've never found any dead cattle that I've thought would've killed. People shoot windmills. Solar. We've had some solar panels stolen. We've had generators stolen. We've had things shot up. I don't see how you could be riding around on a ranch and decide that that would alleviate the boredom.

- [ATV's] really haven't been a big issue. During the hunting seasons, we get a lot of traffic. Now it's just your one or two, we have one guy drive by while we're sitting here. He could be arrowhead hunting or something. Lot of rock hunters. You run into those two or three guys a month that are, they're looking for that lost gold. They're everywhere.

*[Mistrust of government based on historical experiences]*

- They imminent domained five acres right up here. My private land from the pens to across the road, and they were trying to give me like \$3,500. And I said, no, I am not selling you five acres for \$3,500, when it was 45 million project or whatever it was. And that's what puts bitter tastes in people's mouths, things like that. That's why *a lot of these guys up here, they won't work with the government to do anything. There's a lot of bad blood.*

*[Other issue ranchers in this region have talked about is saline, poor quality water from large depths]*

- Poor water, deep water, [the water being too saline].

*[More water wells for cattle are critical]*

- Water's the main thing here. Just finding it out here, having a place to drill. I've never had any trouble getting a water permit, anytime I needed a permit, they're pretty accessible. Drilling is expensive now, very expensive. If we had a water well here [at upside down tank], we wouldn't need it at the farm. A well would be better because then you'd have water year round, because this tank is seasonal. If you found water, you can drill the dry hole too. We've drilled some of those too. But this dirt tank is seasonal. It's while it's raining and wet, we have water. It's gonna have water, but the minute it dries up, it starts dropping every day. And then when it doesn't have any water in it, these cattle won't come up to this end anymore. They go down to the other end. So it's pretty basic. Ranching is simple. It's not complicated.

*[Erosion at railroad]*

- *[At large arroyo], it gets eroded pretty good. They just rebuilt that bridge, I think a year or two ago.*

*[Flooding at village of Rincon]*

- [Ayana Brown: What do you think about the flooding that's been happening there? Just off and on. I know one bridge washed out.]
- We see it coming in right there by the post office where *it floods the road* and they have to, sometimes you have to turn around and go back to Hatch the other way. I don't know. God, I don't know how you'd stop that. Maybe they oughta build a bridge there. But you got bridges that are being washed out too. A lot of water runs down that arroyo.
- [Ayana Brown: But that doesn't interfere with your business so much.]
- No. What happens in Rincon doesn't, but I mean, *it affects the whole area, people as a whole.*
- [Ayana Brown: We had a public meeting down there one time and, and it was in May of this year and we didn't get anybody to show up.]
- I was gonna say, I would be shocked that anybody in Rincon cares. I'm just being truthful. And that's what I figured. I just don't think anybody cares. When it happens, front end loaders are gonna come clean the road up and go back to town.
- [Ayana Brown: So people are just used to dealing with it and nobody will think that it's ever gonna change.]
- I think *it's just one more thought they don't [want to take up].* It's a pretty simple area.
- [Connie Maxwell: Probably until their house is flooded, which the flood commission's got pictures of that, those people probably care.]
- Yes. Yes. And those are the people that *if you know where the flooding takes place and it affects those people, you need to go and let them know, "Hey, we're having a meeting on so and so date, you need to come. Let us know what you think about doing something."* And I think they would *[come to a meeting]* at that point. And then you've got a lot of people in Rincon that could say "I don't speak English, there's no point in me going." And you just gotta let 'em know, "Hey, we can get a translator." I'm a translator. Speak fluent Spanish from English. Read it, write it, speak it.

*We still have to provide public access on abandoned county roads*

- *These counties tend to vacate roads.* We're not gonna fix this road anymore. Okay. So I bought my own road grader. Can I maintain it? Yeah, you can maintain it. Do I have to allow the public to go down it, if y'all abandon it and I maintain it, can I lock the road? Nope.

### Strategies

*[Keep the water on the watershed by spreading and slowing]*

- *The only way to really do slow erosion down and stop silt, brush and things pouring into the Rio Grande River is to detour or hold back some of the water because in a sense that's what's moving it down there is water pressure. Water retention ponds are always gonna be my go-to because it provides more water for our cattle, lets the cattle move around, it opens up more land.*

*[Fencing areas off from cattle is an issue, but would work if access to water is maintained]*

- One of my complaints is we've done some work up in the mountains and it seems like every time somebody wants to do work out here, they want to fence the project out. So now we build a retention pond, we have water, but my cattle can't drink there. When we do work, I don't mind putting fences around it, but when I'm trying to gather cattle, it makes it easy [to be able to] shut the water off to them and I can get them to go different places or I can gather them, but then when we turn them all back out, to have them be able to use that water and cover the land better would be better for the land, the cattle, land, and us, for everybody.
- [Connie Maxwell: I've heard of the areas when it's fenced out, but there's also an access to the water itself maintained. Is that something that you're referring to?]
- That would work. That would be fair. *As long as there's a gate or somewhere that I can open it up to the cattle is needed and shut it off when I don't want them there.*

*[Any structures installed]*

- Another big thing we talked about was *anything we do, we need maintenance and follow up.*
- We've already got stuff built that there wasn't no maintenance done on and that's a big problem.
- If those things were fixed, they would retain a lot of water. And the ponds that we have, the retention pond, we already have that, what I call dirt tanks, digging those out, making them deeper, letting them retain more water, that helps. *Everything you stop here doesn't go downstream.* And everything you put, if you put dykes in and broaden it out, you know it, you do more watering than you do erosion.
- *Slow the water down, let it soak in as opposed to running off, catching it. And retention. Retention ponds as opposed to letting it run down the stream.*

*[Upside-down tank (dirt/pit tank viewed)]*

- That's why they call this upside down tank. It's built backwards. Most tanks are above the berm. This one's below the berm.
- The ducks like it.
- It's one of the deeper ponds you'll find. You don't see many ponds in this area that deep.
- *Where a watershed came and went across this road and then it funneled into a dirt*

*tank and the BLM was talking about maybe taking that dirt tank away. They didn't like the way it was built, but it works so well. And I told them they could have it and I'd let them take it away, but I'd want to drill a water well there. I would think they would've been [okay with that]. There was never any follow up. They probably didn't object to it, but they just didn't do it. And maybe it was maybe my fault for not going in and talking to him, who knows?*

- This is a weird tank that nobody likes, but it works so well. The water runs out of those mountains out of the point of rocks and crosses that arroyo. And then they dug the pit and built this horseshoe looking dyke. And there's a culvert and it fills perfectly every year. And this tank holds water. I've gotten here after a rain when all this is full of water and it, and you can go on the other side and see where it just comes out into the tank. Nobody likes the design. And I don't know who built it. [It was here when we got here.] It's old, but it works so well now. They just said it's a poor design and to me it's not. You have all this grass and brush out here that allows a sediment to drop. It works as a silt filter. And then it goes over there and goes underground through a culvert and comes out in the pond. And that thing holds water like a tin cup. It fills only when it rains, but it holds it really well. It's just the ground is just really good.
- [Ayana Brown: We call this a pit pond. We do this intentionally at NRCS. You have the gentle slopes here for the animals to get down to drink and you have it being well tied in. That would be the only thing of what you started with is there's no emergency outlet, if you will, and you basically, it fills up and then you wait for it [to evaporate]. This is one of the nature forms, but it's engineered, structured. Truly today we would put [an emergency outlet] in ourselves. We wouldn't let it just eat back in the channel. That's the only thing. There's nothing wrong with it going this way. You just don't wanna see it eat back more.]
- I think if somebody was to perforate those dykes and put a culvert in, you would probably destroy it. It would break out there, it would wash out around it. Unless, I mean, I know there's people that know how to do it right. Anytime I've ever tried it, it tears something up. What would help is if you came in here and put some rock down, like where it has eaten out, you could maybe rock fill it out. So where it'd still be porous, but also allow water to flow out. And then even put some big rocks up here so it could roll across them without tearing stuff up. It doesn't tear much up, just ends right there.
- When they built this road, they put some culverts in for me so that if I ever did drill a well here, I could pipe water to the cattle on the other side. That was nice of them.
- But I am pretty sure there's water here and I think the lower off of this hill you'd get the better off you are. If I was to drill a well, I wouldn't want it by this road anyway because it'd just give somebody something to shoot at. I would want to go off down towards that next little fence line about where the pit bottoms out and turns flat. I think that puts you in that watershed .
- [Connie Maxwell: you've got nice grass here. Is this mostly *tabosa* here? And your, your cattle like *tabosa* when it's young, right?]
- Yes. *They'll eat it now [December, when woody]. I don't think they eat the real stemmy stuff, but down here underneath where it's softer and they get [down to it], they're always feeding on this. You can see that even tabosa is leafy down underneath.* It's just the stem sticking up, but that's very palatable. We supplement with it.

#### *Net wire fencing and stone lines*

- And we talked about putting brush piles up in short fencing, different ways to disperse the water.
- [Connie Maxwell: Net wire fencing, you showed an example of net wire fence that's still on the landscape and there was a stone line.]
- *Some of it still works. They've been doing it throughout the years. They just hadn't been any maintenance. You can't believe how many of those dykes and fences are built out through these pastures.*
- You could go up any of these little arroyos here and find places in their origin where you could build one of those little low fenced areas and then maybe rock the backside of it. Because the first flow of water that comes, the first time it plugs up a brush, it's gonna rip it out. *But if you put some of that low fencing in with two good solid posts and then put rocks up, so it'd have to jump, it might disperse it. Dependent on the amount of rain you get. It might work well. It's not a bad thing for it to go over the top. Bad is when it plugs it*

*up and breaks it. Going over the top is just water you weren't gonna be able to control anyway,*

- *You know how much manpower it'd take to come out here and go walk all these arroyos up to where you think they start? Or maybe you can't just put one on every arroyo cause you can go around it and come back in, go up and do a couple of them, two or three at these draw.*
- *[Connie Maxwell: When we looked at that flat area [upstream from road area] that white spot that you were pointing towards, that [grassy area] a great area to try to increase the infiltration and actually reduce the quantity of water coming down and we proposed quite a few stone lines at 60 foot intervals. I think we probably proposed 15, 20, something like that. That was a fairly dense area because you could get a lot of bang for the buck up there in terms of how much water you control.]*
- *That's one of those grassy areas where water comes, grass is good at slowing water down. You know what I mean? Take a water hose and squirt it across the concrete pad and then try to do it across carpet. It don't work. There's a lot of arroyos through that grass area. Where the water has made its way through and opened up and that they're just gonna get worse. They grow. They don't stay small, every time it rains they get bigger. Every arroyo gets bigger. Every time it rains, it's bringing dirt, rocks, brush debris with it.*

*[Brush removal through spraying would be beneficial, though no need for reseeding, but a downside is the killing of the mesquite, which can get the cattle through to the first rain]*

- *We should do more greasewood/creosote removal with spraying*
- *I don't think they would come in, if you did some brush control, then reseed the areas. If you did brush control the grass would come back anyway. I've seen where they do the brush control and the grass just comes back and thick of the carpet. Everywhere I've seen them control the brush, the grass seems to take over. Grass and weeds. It seems to do good.*
- *Neighboring ranches that I've seen where it does work. Now I notice where they do brush control now, they've been doing it for a long time, the brush, some of it does tend to come back. Okay. I mean, it doesn't, maybe not as thick, but there is some that it doesn't all get killed out.*
- *We get so much out of the mesquite, I know a lot of the mesquite dies when they control the creosote, but sometimes during the early spring when it's dry as it gets, and we're waiting for our rain, sometimes our cattle are really making a living on the mesquite. They do real well. I've seen 'em eat the blooms and the beans, and I don't usually see 'em eat the leaves. They're pretty bitter. But when the little tassel blooms, those yellow tassels are out. They don't last very long, but when they come out, there's a lot of them. Sometimes it's all that gets you to that first rain.*

*[Support and collaborate with agencies]*

- *BLM's not been hard to work with for me. Because we've always just done everything we do out of pocket. We don't ever go to them. And that's my fault. I should. We just do what we want to do and make sure it's okay with them, and then we go do it. But I should start going through the available programs, I think the USDA and BLM work together on the spraying the brush, the EQIP program.*

*[BLM annual units for this ranch] ...*

- *are roughly four per section. It's a low number and that's what makes it work.* And then the economics of it all, if you were leasing private country somewhere else, you wouldn't be able to lease it as reasonable as you do from the BLM and the state.

*[Virtual fencing]*

- [Connie Maxwell: let's say we were working on an arroyo, and we put in a bunch of stone lines and one rock dams and that sort of thing, and really, slowed the flow down and did a nice job of bringing the vegetation back. One of the things that is a new technology that's been developed that looks like it might be promising is called virtual [01:22:00] fencing. It's, it's like a dog collar, the satellite sets the line, so you don't have to have a cell connection for the barrier work. So when the cattle get close to the line, there'll be a sound, and then when they get to the line, there'll be a shock, but it's less than an electric fence, all of that's very well calibrated. And that would allow, let's say you've got a virtual fence, and you would want that vegetation in that arroyo in the monsoon season to be protected. And then when it's more vibrant, let's say, late November, when it's not quite as delicate, you can then move the virtual fence and allow for grazing, but you are resting it when it's really delicate and you're trying to get it going. the first couple of years kind of thing. What do you think about that idea?]
- I dunno, *it'd be interesting to see how it works.* Yeah, I know it works, the shock system works. Yeah, it works on dogs. I'm sure it works for cattle, electric fencing works. They stop as opposed to going through it, they stop. It'd be neat to see.
- [Connie Maxwell: Like you say, oh, it'd be great to divide that pasture in half, stuff like that. You let's say it came in because there's a restoration project. You could do whatever you want anywhere on your ranch. It gives you full flexibility. Put a fence wherever you want. It gives you full flexibility. Put a fence wherever you want. So it allows you to then, not just think about the restoration, but.. ]
- ... All kinds of [things] anywhere in the ranch. And you could go home at night with your computer, draw out a new pasture. Might work. I dunno how affordable it'd be.
- [Connie Maxwell: The Jornada have been doing a lot of experimentation. So for research, they've been negotiating these 10 year arrangements with very low monthly fees. And the grant pays for that. So you get it, you get to try it for 10 years.]
- It'd be interesting to see. However you see this pasture right here, I mean, I know what you're saying. There's places you would like the grass to have a better shot. But we're standing right here where the main water is on this end of the pasture is. So the cattle really congregate here. The grass all seeded out, it's mature. It came up and seeded out. It's not eaten down. I mean, I do understand that if you had built one of those little dykes and the grass first started coming out when it was tender, they would've tend to go to it. As opposed to maybe this bigger [grass], I don't know. Think it could work. They might work. If you could just keep 'em away from, like you said, for a while. *I'd hate to have to gather my cows every time I wanted to take the collars off or do something different. They'd have to be something you could control somewhere else.* And then how would you charge 'em? The battery systems. *We gather once a year.*

*[Road turnouts and rainwater harvesting prevent erosion and disperse cattle]*

- It's like this ranch right here, my neighbor's ranch right here, they did a lot of their own road work and they would, if water was running downhill down a road, they would build a berm, and turn it out. And they would have a retention pond right there. Now it wouldn't hold much water, but if it rained, it would disperse cattle because they know there's water there. So they'd move around and then as it dried up, they'd go back to their main water sources. But right when it rained, it didn't erode his roads and that ranch is full of them If somebody wanted to look at it.
- *And it works so well. You retain water. Get it out of the road and then also retain it. It serves two purposes. And then if it overflows the little retention pond it waters the brush around it.*

[End of summary]

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#### Value about the area / Visions for the Future

- *I just love ranching. I like to be with animals. I like to be out here, sometimes alone, out here, away from people. I was born and raised in New Mexico, but then I'm from up north of here also, we used to farm up North. I bought this place about 25 years ago and here ever since. I used to own that ranch south of me too. That's a big ranch. There's 47 sections in that ranch. But I sold it my buddy. This was a big ranch at one time. It went all the way to the check station. But with this, I'm satisfied with what I got. That's enough to keep me busy. I've got other businesses besides this. And so I love it out here. We all do. She does. Put animals out here. We got all kinds of little animals out there. We come and feed every day or something. We stay here once in a while.*
- [Kaustuv Neupane: You have been in the ranching for 25 years?]
- *I've raised cattle for probably 50 years. I'm 86 years old. I've raised cattle since I was 10 years old, really I have been with cattle all my life working on farms.*
- [Description of this region:] *Dry and arid, we could use a lot more rain. Even though we have a lot of country here, we can't run a lot of cattle. My allotment here in this place is only a hundred cows, and that's a lot of country for a hundred cows for how much feed there is.*
- [Changes over time in the 25 years:] *I've seen a lot of changes. We come here sometimes and there's water all over the place. Grass is that tall. And other times there's no grass at all. So we have to adjust. One year to the next.*
- [Connie Maxwell: So a lot of variability. Do you think it's in the last, they say this drought started about 2000. Would you agree? Have you seen that out here?]
- *Oh, yes. And then But like I said, [the drought] comes and goes. And we've had good years, and more bad years than good years, and we have to feed a lot. I haul feed out here all the time. The barns are full of feed right now. So it actually probably cost me more money than I make off the place. But I have other income from other sources.*
- *I love the history out here, there is a lot of history out here. What happened many years ago, the Indian raids, all these mountains. I follow that.*
- *We passed right by a little area over here, the part where we're straightened up the highway. They made a new road and they had to have an archeological survey there, and there were some Indian camps there. I didn't even know it was right there.*

## ADDENDUM V) RANCHER: JIM MCNUTT TRANSCRIPT

When I put a new fence across there, they came out here. And they checked every piece of it. *One area, we had to go make a big wide circle around it because 300 years ago there was an living Indian camp there. I didn't know that there was an Indian camp here. They protect this area, they don't like people running around out here. You can ride a horse any place out here, but you can't drive a car out here, or a four wheel.*

*[The story of this landscape right here]*

- *The Camino Real went through here.* These mountains back in here, you've heard of Colonel Fountain that had been killed? He was a judge. He was killed many years ago. He used to come out here and kept camp out the mountain. *So there's lots of arrowheads out here. There's a lot of stuff out here.*
- [Connie Maxwell: One of the things I was thinking was the Camino Real so here's the line, and I've been up on Gene Alley's part pretty far up. Not all the way to the space port, but before that, and I've seen on Gene Alley's ranch after it rains there's water that still runs. I'm thinking there used to be a lot more springs. There were probably unreliable, which is why it was called the Jornada Del Muerto.]
- *Years ago, there probably were a lot of springs. Back then they, everybody used less water. Right now we're pumping so much water that they can drain water to them hills.* I don't know. *But, yeah, there were a lot of springs around there. It had to have been.*

## Issues

- I don't know if there's a lot of issues, *the challenge is just trying to hope that your cattle can survive out here. Helping them survive. And we do the best we can for our animals. But this last year was one of the worst, we've had bad years before, but last year, even the first part of this year was bad. Real bad. I lost some cows out here. Even though we were feeding, they just couldn't handle it.*

*[Issues heard from ranchers in the region that other people should know about, ranchers are getting older, dying out, and spending more time in town, resulting in less community]*

- Since I've been here, three brothers have already died over there. Anymore, it is not like the old days where you associate with these ranchers, there's too many other things to do now. More people go to town all the time. They don't spend time having a gathering together out here. They go to town.

*[Ranch is very flat, no erosion issues here]*

- [Connie Maxwell: I know your land is it's pretty flat here, right?]
- Real flat.
- [Connie Maxwell: Do you have arroyos running through at all?]
- Arroyos, No. No.
- [Connie Maxwell: No rills, no little drainage patterns? Do you see erosion? Is that an issue for you?]
- No, Not here.
- *The Rincon Arroyo really runs sometimes: It really runs good, but it'd has to rain up in the mountains back there, way up there. It'll then it will run for a few days after it rains.* But that thing does run good.

*[Issues with hunters:]*

- *Hunters leaving the gates opened, cutting the fences.* It happens. *And the game warden's right here all the time too, checking, they help us out. I've got cows now on the next ranch over, the guys were out the other day, the fence was down over there someplace. So we all have problems, not just me, all of us. Had two cows that were shot dead at those cattle guards right there.*

## Strategies

*[Support programs]*

- [Connie Maxwell: Do you think there's anything in particular that might help you in terms of wouldn't it be great if there was a program to do X? Any ideas?]
- What kind of a program? I don't know what there is. *The USDA sometimes they help us with feed. In a real bad time. We haven't got anything in a year or two, but once in a while they give you some money to buy feed.*

*[Herbicides to control woody species on rangelands (site visit to cleared area adjacent to Camino Real Trail, which was not cleared)]*

- [Connie Maxwell: Have you heard about the programs to try to get rid of the the shrubs?]
- *Oh, we have done those, in fact, all this has already been cleared. Twice. They do it with an airplane. They GPS it. We did both of the two different programs, one for the Greasewoods [creosote], and one for the Mesquite bushes. And it's supposed to kill all these weeds, but they'll come back after a few years. It's coming back now, this has been done a few years back. The Camino Real, the old Camino, goes about a mile out there, through here. And when they sprayed this, they have to leave a strip for the roadway. So there's a big strip that they didn't spray.*
- [Connie Maxwell: Can you see a difference?]
- *Oh yeah, there is nothing but greasewood out there. We also call it creosote. But see, whenever they kill the greasewood, it looked like they killed everything. I don't know if it's true or not. It's not supposed to. It supposed to just kill the greasewood. But of course these are weeds that the cows don't eat. The cows don't need this stuff. Even it's green. They don't eat that. See, these are all dead greasewood. And that's what started to come back already. This was done about five years ago, approximately 2017. Look at this, the airplane sprayed all this stuff. Little pellets. It's a pellet and it doesn't dissolve until it rains. And then it's good. Each pellet goes is supposed to kill a square yard or something. I don't know exactly.*
- [Connie Maxwell: You can really see the pattern here where they stopped the spray of pellets at the Camino Real.]
- *Oh yeah, sure. And that road went all the way to Mexico City.*
- *[Challenges for other ranchers in the region]*
- *We all talk about the same thing.*
- [Connie Maxwell: Which is what, need more water?]
- *Oh, yeah. It's always a problem here, not enough water.*
- *Other ranchers talking about erosion on their land: I've never heard of those complaints, except maybe when the roads wash out. Gene Alley has got all of them ranch lands back that way. Has more problems than I do because there's a lot of arroyos in through there. A lot of 'em. And now they put that highway in. They stopped a lot of flows back and forth. For my land, it never rains enough to have much erosion out here.*
- *Management daily routine or seasonal routine*
- *I don't know what to say. This comes natural for us. Every day we come out here, you have to feed the animals, check the animals, and move cows from pasture to pasture. All my cows right now are probably up at the house because I've been feeding them, I've been feeding them a lot of chili and stuff that we haul for them. They can come out here if they want to. Yeah, but they're lazy right now cause I'm feeding them over there.*
- [Connie Maxwell: So your herd stays together and you rotate into different pastures?]

- Oh yeah, sure.
- [Connie Maxwell: I've heard a lot of people don't do that. A lot of people divide up their herds into different pastures and they always stay in the same, but you rotate from pasture to pasture.]
- *We have to [rotate our cows in our pastures], because if we run out of feed here, you supposed to move them to another place over there so that this can rest. If I keep feeding the cows on here, there's nothing left for them to eat.*
- *[Rule of thumb that you use, where you see some indicator on when to rotate:] When there's nothing to eat, but also according the weather, if it rains a lot, we get more feed, we can leave them here longer.*
- *I have three pastures, they are differences, because you know it can rain right here and never get a drop of rain over there. I think it rains more on this side. Because of the mountains I guess. And the further you get, if you get way back east here, it gets a little dryer back there. But like I said, we need more rain. We don't worry about erosion cause we don't get enough rain to worry about it.*
- [Connie Maxwell: Have you had to cull a lot of your cows, sell them early?]
- *Oh, yes, we cull cows almost every year. A few. I'm a small rancher. Compared to some of these guys that run a lot more cows than I do.*
- [Connie Maxwell: When you think about your whole allotment here. When you think about it in terms of areas, you think about it in terms of pastures, right? How many pastures do you have? And do you feel like the pastures have differences?]

*[The next generation's relationship to ranching]*

- [Kaustuv Neupane: And do you think that your next generation will be in the ranching? Your son or your family offspring or been the ranching?]
- *My son-in-law is here all the time with me. He helping me now, but he had to go back to different California. He retired. He has been helping me. My daughter is a school teacher. She's got another four years before she comes back. My son is a dean, assistant dean, one of the Berkeley colleges, and he comes out here all the time. He's got a house in Picacho hills. They're not interested. oh, they love the ranch, but they don't want do any work. They wanna come and look and see what it is. But they don't wanna get dirty. But my son-in-law's been helping me for a couple years now. He's learning how to brand cattle, castrating and stuff like that.*
- [Connie Maxwell: Do you think there's anything that society could do to help the future generations in ranching?]
- *Who knows what's gonna happen? I'm going to say we're going with all these conflicts, might not be here in 20 years, 10 years. We'll all be dead. It's just getting bad out there. And now these nuclear weapons, it's hard to say, we just have to live one day at a time, I hope for the best.*
- [Connie Maxwell: One of the reasons I really love. Meeting with people is because, like you said, one of your favorite things to do is come out and look at your land and read the land, right?]
- Oh yeah.
- [Connie Maxwell: The land tells you so many different things and you learn a lot from it. And in my opinion, it's really important to support folks like you that have that love the land. Not many people know how to read the land.]
- *Oh, I know. Some people are not interested. You have to want to do it. There's people that would never think of coming down here, spending time out here. Oh, no. Go to McDonald's, or a grocery store. Oh it's just a different world now.*

*[Ideas for management improvements]*

- [Kaustuv Neupane: If you wanted to improve your ranching in this region, what would you do, for example if you have unlimited resources, how would you improve your ranch?]
- *If we had a lot of water out here where we could do some irrigating, that would really help. But we don't, it's 400 feet to get to water here, and that's only enough for the cows, you can't irrigate anything with it. And like I said, we have programs out here that the government helps us all. We're putting fences, new fences and we're always doing something.*
- [Connie Maxwell: So do you think folks that have arroyos that might be a good opportunity for them to use their arroyo flows to irrigate?]
- *If they could, it'd be nice. Build a small dam someplace? For erosion control.*

*[Gatherings]*

- [Connie Maxwell: Are there places that ranchers get together? Are you part of the *Cattleman's Association*?]
- No. *I don't belong to them, I just don't like to be fooling around with people. I just like to be left alone.*
- [Connie Maxwell: Did there used to be gatherings? So people have dinners and barbecues and stuff?]
- Oh yeah. *We still have parties out here sometimes. So 40, 50 people come out. I built a little church on my place over there, I'm a Catholic. I built a little tribute for my mother, she died. And we have a gathering sometimes once or twice a year. People like to come out and visit. But now they say, oh, you live so far from town. They say, if I could walk, it'd be all right. But I walked to school when I was a kid, a mile and a half to school every day and a mile half back. I didn't see no difference. It's something you had to do. Now the school bus has to stop at every house.*



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**Value about the area / Visions for the Future**

- X
- X
- X

**Issues**

- X
- X

**Strategies**

- X
- X

*to be added*

## ADDENDUM VI) RANCHER 3: TRANSCRIPT



The following is edited and reordered for conciseness and clarity, and all content is from the interviewee unless otherwise noted and [in brackets]. All items in italics are summary points that may be included in the executive summary of the plan.

#### Value about the area - ranch / Visions for the Future

- *It is resilient. It doesn't take much rain for the desert to come alive. The problem is when it does rain, it normally rains hard and fast. Just not often. But it is resilient as far as growth when we do get rain, but it's sporadic and can't count on it.*
- [Just moving around and looking at it can be a really enjoyable thing. What do you look for? What do you what does the land tell you?] *It is enjoyable. A lot more enjoyable after a good rain. Couple weeks after it for sure. But, I love seeing fat cattle. And I'd rather have better cattle and better quality than quantity anyways, here. But then again, it ain't our sole source of income.*
- *I came to school here [from Northern New Mexico] and when I was off, I worked for a guy that owned the ranch and I just never left. So had, he gave me a chance to buy it and here we are.*

*[Vision for the future, for the region, for ranching:]*

- *Ooh, I don't know. Ranching in the desert's a tough go no matter what it is. But it's gives me and my family a way of life. Not our sole source of income, but definitely a good portion of the work we put in throughout the week, but we love it. It's not easy. I just love being out away from everybody. It's peaceful and quiet out here. Very few issues.*

#### Issues

- *Mostly our biggest issue is the current drought that we've seen.*
- *[Issues that ranchers in the region talk or complain about that you think might be representative:] Not really, other than the lack of rain, which we all can't control. And that doesn't help the runoff either. Because the hillsides are bare.*

*[ATVs]*

- *We do get some recreational traffic on four wheelers, motorcycles, and Jeeps. But overall they tend to stay in the arroyos. They're not too bad about running all over the hillside, but they do. That and our fencing because they leave a lot of gates open. ... What pisses me off when I see someone go off road, one person does it, then someone else sees it and they go. The second guy might not have done it, it's that first guy that causes all of it.*

## ADDENDUM VII)

## RANCHER 4: TRANSCRIPT

- Connie Maxwell: I've noticed that when I've been speaking with Nancy, it's like a magnet. Once you do it once,
- Then the second guy, someone's already done it. I ain't hurting nothin'. And then they do it. And then pretty soon it's a well-traveled road.

*[Erosion in areas of more flows:]*

- *I see more sediment removal/erosion clear down here on this side because of those fence lines over there. We just had it refenced and there are places it's almost completely silted in already. And the problem is that water on that side of the ranch is generated and falls on us, it doesn't flow much across the interstate. But as you can tell on the other side of the main arroyo, you can see there's a few bigger arroyos they tried to fill in. The county tried to fill them in and they're completely washed back out. Worse than they were. The arroyos were undercutting their county road, so they just filled them in and they hauled a significant amount of dirt in, but it's already cut back. Worse than it was. [Erosion, at area of headcutting that appears to be occurring on geologic timescales:] I don't see a lot of movement on the top edge. It's minimal until you get down into the main arroyo. And then it's obvious that it does occur, but right up in these hillsides, it is minimal, but it does happen.*

*[Erosion at mesa that drains into the Rio Grande from the East]*

- *I see erosion happening up here on the top. This edge is moving back. And what's happening is all that water from the flats pools, and hits the road. And down here, one thing's interesting is all the roads are dug in. I'm from Northern New Mexico where all the roads are built up. But when we dig all these roads in we create a channel for that water to run. Wherever that water's gonna get off, it eats it. I've noticed a lot of that, even our driveway. You look at our driveway when it rains, that thing is an arroyo. And it moves a lot of water.*

*[Other observations about the ranch:]*

- *It's interesting to see how the main arroyo changes paths. And I've only been here 10 years and it's moved a bunch, and it's consumed more land. Left some alone. After a hard rain and that arroyo has run, it's a different path almost every time.*

*[Fewer observations where no water for cows:]*

- *All that area up here, we don't have much land up top, it's all hillsides right through there. And they're not moving much sediment from there. Not that I've seen. But I don't spend as much time up in there. My cattle don't go up there as much and I really have not probably documented the change as much as the lower part down here by the interstate right down in this area.*

## **Strategies**

*[Interest in and amenable to low impact type of practices, like stone lines one sees in the region that were probably put in the thirties by the CCC and net wire fencing, that would go in the arroyos that would spread flow out just to try to dissipate some of the energy and get it infiltrated into the soil before it came downstream.]*

- *Yeah. I don't see where it would affect us from a ranching standpoint, other than our cows might tear it up, but, as far as it hurting them, no. And a lot of our main sediment is coming down out of those mountains. We've got three main arroyos through there that when it rains, those fences are gone. It's usually the same three on [my neighbor's] side and mine. [We are frequently] coordinating fixing fences, my cows don't seem to work that area up there because I don't have any waters up there, but [my neighbor's] cows, they do. So it's more of a big deal for [my neighbor] than it is me.*
- *Like I said all those little practices, I don't see where they hurt us. If it was a private, though, I don't know if I would do that.*

*[Dirt tanks, function of spreading and slowing flows of benefit, though equipment will disturb land:]*

- *You could create some dirt tanks down there at a lot of those arroyos. I know it's a lot of ground disturbance initially, but it might, you have a shot at keeping some of it back. ... It's a hell of a lot of real disturbances just getting machinery in there though. That's a whole another issue, right? And once you do it, here comes a motorcycle, and a four wheeler. That's the problem.*

*[Larger dirt tanks, if not maintained and breach have been seen to cause significantly more erosion and headcutting than the original issues, but several smaller passive ponds have less risk]*

- *That's what I think, yeah.* You ain't gonna be able to stick one right here where it's crossing and running, wherever the interstate is, you can't stop it right there. .. BLM hasn't wanted to let us put water up [in a particular part of the ranch].
- [Connie Maxwell: I know when I was talking with [a former BLM manager] before he retired, he didn't wanna put in dirt tanks, I think particularly because maintenance commonly falls through and when they blow out they cause these problems. And also, they're harder to maintain.]
- *Yeah. You gotta maintain them too. And clean them. And if you don't clean 'em, you're gonna cause a blowout.*

[Connie Maxwell: And also because then the cows are right in the channel area if you're putting the dirt tank in the channel, then you've got a challenge. He was always in favor of doing water from wells away from the drainage path, in areas that are less sensitive. I'm wondering if the dirt tanks are out of the channel, a lot smaller, the flow runs through them passively, and there's a bunch of them in a series.]

- You hit some of these and *get them up there where you're getting two or three little fingers, instead of one big finger.*
- [Connie Maxwell: *If you created a series, a pattern, where there's more of that. Particularly in one arroyo, so the whole thing stays wetter more than they'll last longer.* So it'd be good to try those kinds of approaches. Cows are pretty smart. Once they know, oh it's raining, I know those things are gonna be full.]
- *Our [cows] will go up there after a rain. Just because the natural occurring pools in the arroyos, but it doesn't last long.*

[In combination with ranching needs:]

- *If you could keep water up in that area, helps our grazing dispersion immensely.*

[Given all the money in the world, ideas to implement that would make ranch management easier and improve it:]

- *If it was all a hundred percent private land, I would try to pool the water up better - more dirt tanks. From a selfish point of view, I'd be trying to keep the water on us, for numerous reasons.* But if it was all private land, that would be what I did, I would stop it.

[Support from government programs:]

- *I really am not real well versed on government programs cause I really do not go after any,* so I can't really speak to that. I haven't really pursued any government programs. The previous owner of the ranch did, and that's how we got some cross fencing done. And I might ought to look at it because a little more cross fencing wouldn't hurt but from a cattle perspective. But it doesn't necessarily help controlling the erosion.

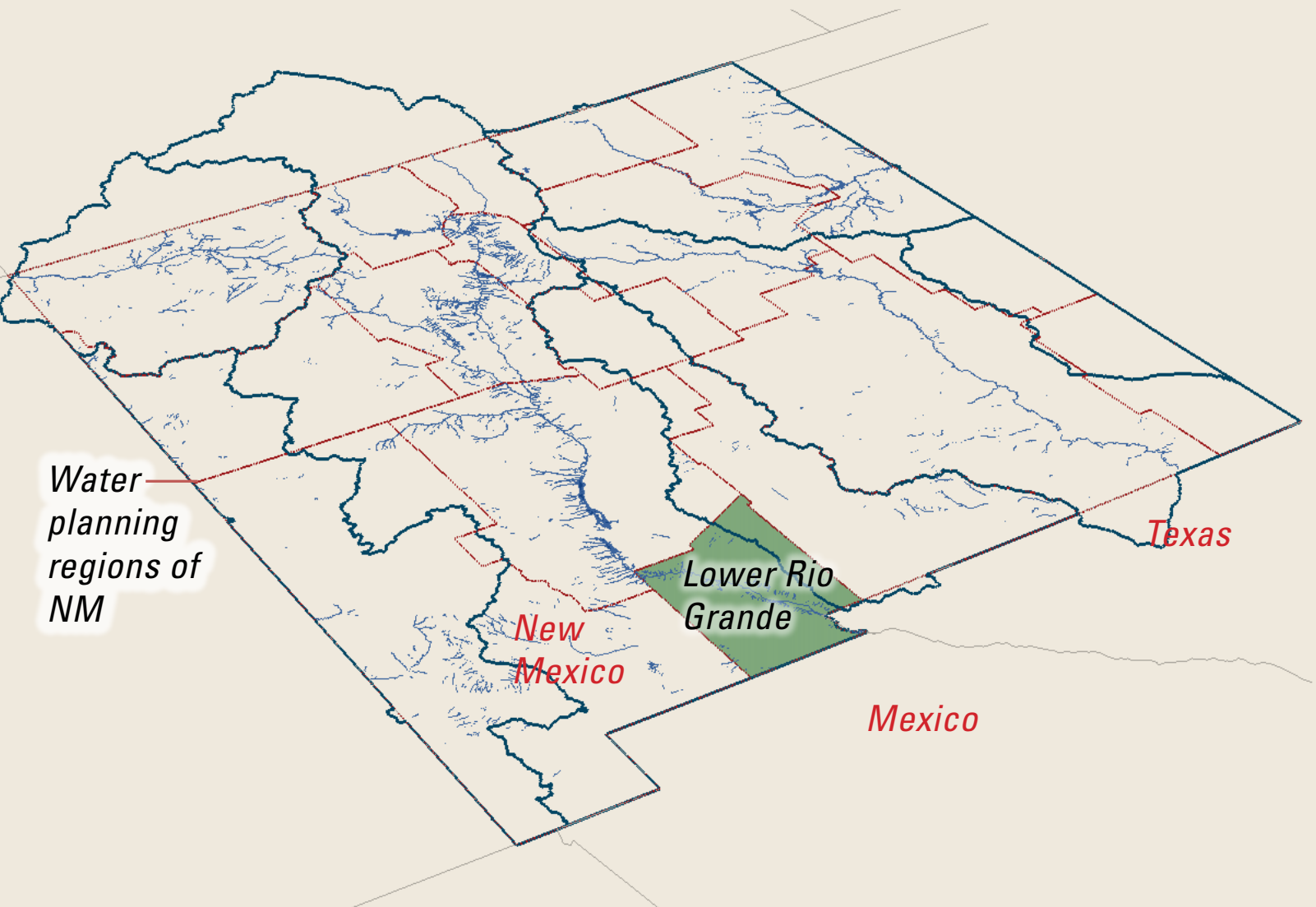
[Current grazing management strategy and benefits of more water to allow cows to disperse:]

- On this side of the ranch, it is just one pasture. And we do rotate them. Most of these come off and either get moved, we got several pastures over here. *We rotate about six months on, six months off.* And over here, our cattle dispersion is limited by water. Our water, we have got 1 windmill basically straight down from here, which would be, I think right in here somewhere. And so our cattle dispersion up there is not ideal, *and that's some, that's some of our best grassland is up in there too, though.* Where the windmill is, or on past, is where I can't get any

cattle to disperse. *[So more water up there] would help cattle dispersion. Which in turn if you can get the cattle to disperse, it does help the impacts of cattle on soil disturbance.*

# **ADDENDUM VIII) WORKSHOPS AND PANEL FULL TRANSCRIPT**

# 6.4 Lower Rio Grande (LRG) REGION FULL TRANSCRIPTS



These transcripts are also included in:

Maxwell, C.M., M. Sheely, L. Conrad, K. Perez, A. Hanson, S. Langarudi, A.G. Fernald. 2022. *Community Conversations For The NM 50-Year Water Plan: Managing Water For Future Resilience*. New Mexico Water Resources Research Institute. Miscellaneous Report No. 34

# Lower Rio Grande (LRG) Stakeholder Visions for a Resilient Future

## Workshop Participants

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New Mexico Dept. of  
Agriculture

*Soil and Water Conservation  
District Specialist*

**Caiti Steele,**  
USDA Southwest  
Climate Hub

*Coordinator*

**Christopher Brown,**  
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**Davena Crosley,**  
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**Dennis McCarville,**  
Elephant Butte  
Irrigation District

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**Don McClure,**  
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New Mexico State  
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*Retired Professor*

**Elizabeth Verdecchia,**  
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New Mexico Water  
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**John Hayes,**  
Audubon Southwest

*Executive Director*

# LRG Stakeholder Visions for a Resilient Future, cont.

## *Workshop Participants, cont.*

**Patrick McCarthy,**  
**Thornburg Foundation**

*Water Policy Officer*

**Bob Sabie,**  
**New Mexico Water  
Resources Research  
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*Research Scientist*

**Rusty Stovall,**  
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**Sam Fernald,**  
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**Craig Fenske,**  
**Dona Ana Soil and  
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*Supervisor & Board Chair*

**Stephen Scissons,**  
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**Angel Montoya,**  
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**John Gwynne,**  
**Doña Ana County Flood  
Commission & Stormwater  
Coalition**

*Director & Chair*

# LRG Stakeholder Visions for a Resilient Future

## *Panelists*

**Craig Fenske,**  
**Dona Ana Soil and Water**  
**Conservation District**  
*Supervisor & Board Chair*

**Jerry Schickendanz,**  
**New Mexico State**  
**University**  
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**Gary Esslinger,**  
**Elephant Butte**  
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**Jeff Witte,**  
**New Mexico Dept. of**  
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*Director Secretary of*  
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**Kevin Bixby,**  
**SW Environmental Center**  
**& Dona Ana Soil and Water**  
**Conservation District**  
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**John Gwynne,**  
**Dona Ana County**  
**Flood Commission &**  
**Stormwater Coalition**  
*Director & Chair*

**Gill Sorg,**  
**City of Las Cruces**  
*City Councilor*

**Don McClure,**  
**Bureau of Land**  
**Management**  
*Assistant District Manager*  
*(Las Cruces District)*

**Steve Wilmeth,**  
*Local rancher*

# LRG Workshop Introductions

*This workshop was in collaboration with the Hatch and Mesilla Valley Watershed Planning process, funded by Bureau of Reclamation's Cooperative Watershed Management Program and led by the South Central New Mexico Stormwater Management Coalition with partnerships with the New Mexico Water Resources Research Institute and the Alamosa Land Institute*

## **Connie Maxwell, NMWRRI.**

Great. Thanks. I am going just by the participant list in case you want to know you're coming up. It's somewhat alphabetical.

## **Davena Crosley, NMED.**

I am Davena Crosley with the New Mexico Environment Department, the Surface Water Quality Bureau.

## **Katie Kruthaupt, NMDA.**

Katie, New Mexico Department of Agriculture. I work with the soil and water conservation districts.

## **Connie Maxwell, NMWRRI.**

Thank you, Dennis.

## **Connie Maxwell, NMWRRI.**

Great. Thanks Caiti Steele.

## **Dennis McCarville, EBID.**

Hello. I work in the engineering department with Elephant Butte Irrigation District. My name is Dennis McCarville.

## **Caiti Steele, USDA-SCH.**

Caiti Steele. I'm the coordinator of the USDA Southwest Climate Hub based in Las Cruces, New Mexico.

## **Connie Maxwell, NMWRRI.**

Don.

## **Connie Maxwell, NMWRRI.**

Thank you, Chris Brown

## **Don McClure, BLM.**

Good morning. I'm Don McClure, the assistant district manager BLM here in Las Cruces.

## **Christopher Brown, NMSU.**

Morning, Christopher Brown and the faculty member of the department of geography and also on the executive committee for the water science and management program from which county graduated with high distinction.

## **Connie Maxwell, NMWRRI.**

Phil,

## **Phil King, NMSU.**

I'm Phil King, a recently retired faculty member from civil engineering at MSU, also on the water science and management executive committee formerly also with Dona Ana soil and water conservation district once upon a time. And I do apologize. I'm going to have to bug out at 10 o'clock here. I've got a date in court.

## **Connie Maxwell, NMWRRI.**

Thank you, Chris. Davena.

# LRG Workshop Introductions, cont.

**Connie Maxwell, NMWRRI.**

Thank you, Liz. Liz. Can you hear us? I see. You're un-muted.

**Elizabeth Verdecchia, IBWC.**

Okay. My I'm trying to figure out the mic. I am the Natural Resource Specialist with IBWC Environmental Management Division. Liz Verrdechi. Yeah.

**Connie Maxwell, NMWRRI.**

Great. Thanks Jennifer.

**Jennifer D'Annibell, NMDGF.**

Hi Jennifer D'Annibell. I'm the Southwest habitat biologist for New Mexico Department of Game and Fish based out of Las Cruces

**Connie Maxwell, NMWRRI.**

Great, thanks Jessica.

**Jessica Knopic, BLM.**

Okay. Good morning, Jessica Knopic with the BLM civil engineering operation section.

**Connie Maxwell, NMWRRI.**

John Hayes.

**John Hayes, AS.**

Hey everyone. John Hayes, I'm the executive director for Audubon Southwest

**Nikki Dixon, NMWRRI.**

Good morning. I'm Nikki Dixon. I've recently moved back to New Mexico and prior to that, I'd spent about 20 years in watershed planning and outreach and extension work. And I'll be working with a New Mexico water resources research Institute on the new grant doing watershed implementation.

**Connie Maxwell, NMWRRI.**

Patrick.

**Patrick McCarthy, TE.**

Yeah. Hi everyone. I'm Patrick McCarthy. I work for the Thornburg foundation running their new water initiative.

**Connie Maxwell, NMWRRI.**

Welcome

**Bob Sabie, NMWRRI.**

Bob Sabie I'm a research scientist at the New Mexico water resources research Institute.

**Connie Maxwell, NMWRRI.**

Rusty.

**Rusty Stovall, BLM.**

Good morning, Rusty Stovall all BLM Las Cruces, chief of operations.

**Connie Maxwell, NMWRRI.**

Thank you, Sam

# LRG Workshop Presentations

## **Sam Fernald, NMWRRI.**

I'm Sam Fernald, Water Resources Research Institute, and watershed management professor at New Mexico State University.

Hi, good morning, trying to put on my video. There we go. Good morning everyone. I'm the chief of operations and maintenance division for the happy.

## **Connie Maxwell, NMWRRI.**

Thank you. And finally, Zach

## **Zachary Libbin, EBID.**

I'm Zach Libbin with the Elephant Butte Irrigation District. I'm a district engineer here and I also help with the help John Gwynne with the storm water coalition.

## **Connie Maxwell, NMWRRI.**

Thank you all. I will go ahead and play Edwin's video. It's not terribly long about 20 minutes. And apparently there's a good way you can share this particular. It's funny that it's not on there.

## **Ed Singleton, BLM.**

My name is Ed Singleton. I'm a past district manager for the Bureau of Land Management in Albuquerque, New Mexico. I wanted to talk to you this morning about partnering for watersheds and specifically the Rio Puerco Management Committee. My background is I spent nearly 40 years in the Bureau of Land Management. Started in the Forest Service in fire management. So I've got a broad background in fire and forestry across New Mexico, Colorado, and Oregon. And my way back to New Mexico when 1998 became the district manager in Albuquerque.

And in 1996, the Rio Puerco Act was passed. Sponsored by senators Domenici and Bingaman, which created the Rio Puerco Management Committee and the watershed restoration efforts. Next.

The Rio Puerco was a huge watershed in north central New Mexico. 4.6 million acres in six counties, involves numerous federal agencies, lots of state land, lots of tribal lands, and some forest service lands as well. It is a very complex landscape. It varies from coniferous forest down to salt desert shrub areas and grasslands in between.

So just a real diverse landscape. Next. The Rio Puerco Act was recognizing a citizen based group that also called themselves a Rio Puerco Management Committee, which formed in the mid nineties to advance a watershed restoration in the Rio Puerco. Probably one of the key individuals to start this group was Ben Casals an irrigator and representative of the Acequia association in Cuba.

And he recognized that if they were gonna continue to have viable agriculture in the Cuba area, they were going to have to do something to enhance the watersheds that fed into the water systems. They started talking with some of the congressional representatives as well as the government agencies.

That was the foundation for the Rio Puerco Management Committee. Next. The Act recognized the Bureau of Land Management as the lead agency for the Rio Puerco Management Committee. It also laid out an expectation that federal agencies, state agencies and tribal governments work together to come up with plans to restore this enormous watershed I believe key and critical to the efforts of the Rio

# LRG Workshop

## Presentations, cont.

Puerco was the fact that we had this, I'll call it infrastructure, of executive leadership. I served the district manager position to BLM, served as the designated federal official, and was responsible for executive coordination amongst all agencies. And I believe the key to the success of the legislation, the key to the success of our real program management committee, was the fact that we had not only executive commitment, but we also had a level of scientific and technical commitment from staff in these different agencies. Then we had a commitment of on the ground worker bees to get projects done; studies completed all the work that we needed done. It was truly a large stakeholder group effort.

Next, we also had a number of special interest groups that chose to join us and support us at the time. The Quivira Coalition, the Rio Puerco Alliance, which was a 501 C3 that was developed off of the Rio Puerco Management Committee, Wild Earth Guardians, Audubon, the National Wildlife Federation, a New Mexico Wildlife Federation and RMEF Rocky Mountain Elk. All of these folks joined us. They attended meetings, they supported and helped us organize volunteer projects and project work. They helped fund some of the project work and training sessions. It was truly a large cooperative effort. Next.

One of the first things that we did as a group was we met four times a year every few months. And it wasn't unusual for there to be 40 to 50 people in the room per meeting. We had a trained facilitator to keep us on track and keep notes. Some of the responsibilities of the BLM was to hold meetings, take notes, disseminate information gathered at the meetings. We developed a website,

everything was published on it. It became a very efficient operation.

One of the first things that we decided though, is that we needed a mission and a vision. We developed that. We also decided we needed to determine what the probable causes for the water quality impairment was. The Rio Puerco was a listed stream by NMED under the Clean Water Act.

So, we got all the technical people together and we also got anecdotal information from all the landowners and ranchers. People who had been on the land for many generations and through a number of different processes—some of them scientific, some of them with remote sensing, some of them with review of literature—determined that these are the things that really impacted the watershed and things we needed to address drought.

Unfortunately, we're still dealing with. And climate change today. Brush and shrub encroachment, gullies erosion. A big one in this watershed, and I think a big one in your watershed, is going to be forest conditions. We did find we had a sense that roads were a big problem. We subsequently funded a study that determined that roads was the number one problem in accelerating erosion—man-made erosion—in the Rio Puerco. Also, grazing, including wildlife, and stream bank destabilization.

We focused on best management practices. We're charged by EPA and NMED to develop long-term water plans. So the first plan that we developed was a water restoration action strategy that was completed in 2001 and approved by EPA. That allowed us to join a list of competitors nationwide in competing for EPA grants and

# LRG Workshop

## Presentations, cont.

NMED grants. We were very successful in developing proposals that were funded to do work on the ground.

I should say, I retired in 2014 and took a year off. I told the group I wasn't going to be involved with them because it wasn't going to be my committee or BLM's committee necessarily anymore.

I started attending meetings again in 2015 and found myself drafted back into the effort, and assumed some leadership over the group. We were told that we needed to develop a watershed based plan in order to compete for new funding. So in 2016 we, the group, developed this plan that was approved by the EPA.

We did this plan as well as the 2001 plan in-house without contractors and without paying for folks to come in and do this work for us. So I'm pretty proud of that. I think the group worked really hard, both in 2001, in 2016. We were able to raise approximately \$9 million that was invested in restoration practices in the Rio Puerco.

Some of that was appropriated funding. I would say less than a million dollars of that was appropriated funding. Probably nearly \$8 million of that was grants and monies that were able to compete for input on the ground.

One part of the effort that I'm most proud of, and it took us a few years of coordination with the Native American communities, but we developed what we called the Navajo Youth Program. Every summer we were able, through the chapter houses, to employ about 25 of their school aged kids.

I think there were 16 or 17 to 20, in doing

on-the-ground, resource work, watershed improvement work. Some of it was pretty hard and pretty dirty, but it was very effective.

These rock dams—and I call them modified Zuni bowls—in strategic areas in the upper watershed helped to stop head cutting and help these areas heal. It did marvelous restoration work. Next.

As you can see, this one the rocks catch the water. Seeds stabilize the soil and help the area to recover very quickly. This is the first year after the work was done. Fortunately we had fairly good rainfall. I don't remember exactly what it was, but it was normal to above normal rainfall. Got a good response. Just another drainage where we had done the same kinds of work. I think this was a different year, under a little different rainfall regime, but you can see the stabilization is working well. Next.

We ran the youth program for about ten years and it didn't cost us a lot of money. We used Navajo youth, crew leaders, and coordinators. They did quite a lot of pole plantings in the upper Rio Puerco and Upper Chuwillie drainages. One of the main impaired drainage's in the Rio Puerco. Many of these plantations exist today, were quite successful. Next.

Another area we worked pretty exclusively in was a Savoy Creek, over in Cibola County, near the National Recreation Area. We had some gullies coming at us in the Savoy wilderness from Savoy Creek. This happened to be a big National Wildlife Federation project. We did probably eight or nine years of projects with New Mexico and National Wildlife Federation doing one rock dams and backing up the water table in the Savoy Creek. Next.

# LRG Workshop

## Presentations, cont.

Some of the work we did with NMED and NMED grants. We hired Bill Zedyke and Steve Carson to write up a restoration plan on the upper Savoy. They brought in some equipment which worked outside of the wilderness, but was able to construct Zuni bowls and other plug-in pond structures. They were able to restore that upper Savoy Creek area. Next.

There is a modified Zuni bowl that was just constructed. I don't have any "after" pictures. This was taken in '13. I retired in '14. I haven't been back to the look at these. That's on my to-do list. Go back with Cameron, take pictures of many of these. Next.

I think the the next thing I want to do is give you what I consider to be the key elements for success in the group you're trying to put together. And that is, you've got to have some fairly high level support in some of these agencies. In your case, that's going to be the Bureau of Reclamation, NMED, hopefully the Forest Service. They control the upper watershed and a lot of the streams that feed the Rio Grande downstream of the dam.

Hopefully they'll want to engage in and help with this effort because it is in their best interest, as well as everyone's, to help solve this problem. Elephant Butte Irrigation District, I've found initially, I'll say initially 20 years ago, was resistant to working outside the green line. I believe their leadership saw the light and they're completely on board. That's a great thing. They understand that water is produced in the uplands and they've got to worry about all of it. I think they're a key and critical partner. But it's that level of commitment that needs to happen.

The other thing is trying to engage all the stakeholders. I think we responded to NMED's advice, especially in 2001. They said you can't work everywhere in shotgun projects in a 4.6 million acre watershed. So we went through a prize prioritization process. USGS assisted with remote sensing, and we determined the worst watershed, the worst sub watersheds in the Rio Puerco.

We focused our efforts there for the first eight or nine years. And I believe we were successful in seeking grant monies and getting securing grant monies and getting work on the ground because of that. But it caused some of our other stakeholders to lose interest, walk away because they weren't in that priority sub basin. If you can treat everybody the same, go with the worst problems that exist across the watershed. It'll probably be in numerous sub-basins.

Going back to the Forest Service, I could never get engagement higher than the district ranger, but I also realized that the district rangers have a lot of power and authority in the Forest Service. I was trying to get the forest supervisors involved. At one point we had a forest hydrologist who was involved with the project for a number of years. She happened to have come from the BLM. Carol van Doren, the Santa Fe hydrologist, was very interested in this project. That gave us tremendous support. When she left, that level of support at the supervisor's office left. It's critical to engage those district Rangers and get them to buy into the vision of what you're trying to accomplish. They too will reap the rewards of good work on the ground. I know that the Gila is a fire forest. I know they do lots of prescribed natural fire.

# LRG Workshop

## Presentations, cont.

I don't think they do nearly as much prescribed fire as they could because it's hard to get funding—the liability is worse. It's a lot easier to let one burn than it is to light one and worry about it for the next month. But they need to get more aggressive on the prescribed fire front, as well as continue with prescribed natural fire work they're doing.

One of the things I wanted to come back to because I think it was a critical mistake on my part. I had worked in the budget office in Washington in my career, knew the budget process very well. It occurred to me and in our conversations with the budget folks, that it didn't make a lot of sense that we were getting this mark. I mentioned we were getting a mark in our appropriation of about three to \$400,000 a year from the BLM's budget. Upfront, we got, I think \$300,000 one year, \$400,000 one year. That was money, in addition to BLM's budget, which was great. After that, it was just a designation of monies within the BLM's soil, water, and air budget. But I thought in conversations with the BLM Washington office budget people, why don't, if that mark has been in existence for 10 years, why not make that a permanent mark? Just establish it as a permanent appropriation within BLM New Mexico's budget: \$400,000 a year is going to be Rio Puerco restoration. And they agreed. We did the necessary paperwork. They coordinated with Office Management, put in budget. They got it all done in the first year. It was great.

We had the \$400,000 mark and it was used on the ground and worked well. I think that was 2012. In 2013, they changed the language in the budget that came down: Included in your base is \$400,000 to do the Rio Puerco restoration. Which meant what

they were doing was earmarking \$400,000 of New Mexico's soil, water and air budget to the Rio Puerco restoration. Which meant that \$400,000 came out of somebody else's budget—some of the other districts or the state office. That didn't go over very well. The State of New Mexico BLM made sure that the biggest part of that money was within Albuquerque's allocation.

So in other words, we hurt ourselves. Instead of getting more money, we got less money. So that's just a trivial piece. I would say, try not to pursue things like that; they may backfire on you. Right now, you're in a formation period and you're trying to get people to the table to buy into a vision and a mission and support the restoration of, again, a fairly large watershed down there that has significant impacts on agriculture and irrigators and in the livelihood of a lot of people down through the river valley itself.

Any questions?

### **Connie Maxwell, NMWRRI.**

Thank you. That was really terrific. I think incredibly helpful for our group. We really appreciate the information that you've given. I think it will both help the workshop that will come after your particular presentation in getting us started.

I have to admit you covered so much, I don't really have that many questions. I do have one specific question and I think you are better qualified to answer this than most, being a BLM district leader. The question is, were you able to come up with a streamlined strategy to do watershed restoration from the BLM, the different requirements to do the watershed restoration? Particularly NEPA and those sorts of requirements.

# LRG Workshop

## Presentations, cont.

One of the reasons I asked that is, I know that our BLM office down in this area, who have been playing a really great leadership role on these projects, does have extensive requirements. But also did try to develop an approach, which I think they will be pursuing, where the idea was to be able to approve different practices.

Right now we have a focus project in the Hatch and Mesilla valley. It's the Rincon Arroyo watershed, which is a pretty large watershed within that region. The idea was to do an environmental assessment (EA) that pre-approved different practices and the practices could go into different areas. Things like one-rock dams and Zuni bowls and stone lines and things like that in order to make it easier when there was going to be a project that came in on the ground, most of the paperwork was already done. It was then just a simple addition of, "yes, this site looks good," type of thing. Did you have any other similar insights as you were going through, doing restoration in so many different areas? Did you find ways to streamline the process? Were you able to take results in one area and help replicate approvals for other areas?

### Ed Singleton, BLM.

Yes, the methodology that you just explained is one way to look at it. Break up the area into sub-basins and then do EAs on sub-basins. The other thing you can do is, do EAs on practices. Do a programmatic EA on brush removal and then different brush removal methods. And you can apply that across the landscape. At the time you do the project, you do a very abbreviated EA face sheet process with, take a look at TNE species and certain critical items on the specific area you're looking at. So it's a very

much abbreviated process and you don't spend a lot of time replicating paperwork. So I think it's programmatic by process or by geographic area, if you will. So that's worked well.

### Connie Maxwell, NMWRRI.

Yeah. Does it have to be both? Because I know the programmatic EA that they were looking at was just for the Rincon Arroyo watershed. Could you then take that and apply those practices to say, in fact we don't see any reason why you can't put in a one-rock dam anywhere in the Hatch and Mesilla valley, or is that specific to the geographic area?

### Ed Singleton, BLM.

I think that it depends on how they write it. You could do it both ways, but I think it would be most efficient to address common, best management practices within the entire watershed, within that sub-basin. And then that way you can say, this type of project would have similar impacts in this area, as well as other areas of the watershed.

I think there are ways of dealing with NEPA where you're not generating mountains of paper and duplicating lots of effort.

### Connie Maxwell, NMWRRI.

I think one of the other things that's particularly inspiring is your youth program that you did for ten years. Did you find any other resources or any other youth programs?

### Ed Singleton, BLM.

I know that you and I have discussed the idea of the YCC becoming common again.

# LRG Workshop

## Presentations, cont.

And I know that you had mentioned that it looks like NRCS and BLM are going to be the lead agencies that are working that out. So we'll try to see if there's going to be some funding with that.

### **Connie Maxwell, NMWRRI.**

New Mexico has several youth programs as well. It sounds like there's a lot of room for that. Certainly helping getting the community involved and the youth and their families.

place to fight fire. We've had some near misses in there historically with firefighters nearly being trapped and overrun by fire in that rough country.

I know that still exists today. But my thought was the BLM particularly, and probably the state, needs to do some proactive planning to put fire on the ground in there. Don't wait for the next natural ignition, because it may be 20 years and it may be a terrifically damaging fire. Put fire on the landscape at intervals that limit catastrophic fire.

### **Ed Singleton, BLM.**

Yeah, I believe in using any of the authorities we currently have, I know we funded some work through Rocky Mountain Youth Corps. AmeriCorps talked to us about doing work. There was another youth program associated with a facility that was built up in the Cuba area, where they had at-risk youth that were looking for Civilian Conservation Corps type work. All of that work is really meaningful work. And I think it teaches kids the value of environmental work on the ground.

### **Connie Maxwell, NMWRRI.**

Thank you, Ed. Because Ed wasn't able to be with us, I'm sure there's some questions that are not answered. So if folks have questions for Ed, please do bring those up. Rather than spend a lot of time on that, I think what I'd like to do is switch to our conversation about visions for the future.

I'll be capturing some of your actual thoughts. Often, what we'll do is we'll start and we'll talk about issues and strategies first and then build to visions.

### **Connie Maxwell, NMWRRI.**

Ed, I'm sure that our folks are going to have other questions, so I'm going to stop it there. But thank you very heartily again, and we will circle back.

Because, as a group, we've met several times and though we have more discussion on issues and strategies and details to work out, I think it would be nice to try to, at this point, imagine this campaign that we've been talking about that we want to build. And start to document what our measurable visions for the future are, thinking about everything that we've done.

### **Ed Singleton, BLM.**

I did have one thing that I forgot. Just put this in the back of your mind. The Sierra de las Uvas mountains there are pretty unique landscape, and quite a number of years ago the BLM developed a special fire management strategy in that landscape. Primarily because it's a really dangerous

Like I said, as we go forward, other visions will arise. We can circle back and capture those. An example: "what would it take for you to revegetate the uplands to mitigate flooding and sediment transport by 2030?"

# LRG Workshop Visions for the Future

*Question: Taking into account what is valued about the region, what is your desired vision for the future of your land and the region with short, medium, or long term goals?*

Or, "by 2030, what would it take to refill, replenish, groundwater to the extent that is reconnected to surface flow?"

So open floor visions for the future. Any questions for Ed that I can pass along and have him send us answers back.

## Zachary Libbin, EBID.

Connie, can you repeat the question just a little bit? I do have a vision, but I'm not sure if it fits the question you asked.

## Connie Maxwell, NMWRRI.

I think that one helpful way to think about it is, there are lots of different strategies that we'll want to employ, but what is it about the Rio Grande area, down here in the Hatch and Mesilla Valley, that you value? Or that your stakeholders value? And what overall vision can capture several strategies? It can be just focused on one strategy as well. But let's say in ten years time, what would you like to see this group contribute to accomplishing? What sort of vision of the future would you like to see for this region?

## Zachary Libbin, EBID.

So the vision I'm going to pitch to you first is a **significantly reduced sediment transport that leads to less sediment reaching the Rio Grande.**

## Connie Maxwell, NMWRRI.

Give me a couple of ways to measure that. So by a certain time and maybe some way, some sort of trigger for less sediment, some sort of indicator.

## Zachary Libbin, EBID.

I'm going to ask Xochitl to help us with a way that she thinks we might be able to measure that. But on that note, I think just requiring less sediment removal from the river would be measurable. These are all very hard to measure tasks, right? Reconnecting the surface water the groundwater recharge goal you have.

They're very hard to to quantify. For example, if it rains a lot, we have great precipitation, it will happen. If it doesn't, we won't. But measuring how much of a difference these efforts make is challenging, right? Similar for the sediment transport. If there's big rains, it will bring more sediment down. If there's not, they won't. Measuring how much of a difference these measures make is challenging, but **on a larger timeframe, having to dredge less sediment, haul away less sediment from the river would be measurable.**

## Davena Crosley, NMED.

A question to maybe help me understand, though. Would it make sense to pick one specific spot? I'm thinking about the the bridge at the lower end of Rincon Arroyo. And think about how many times, under that bridge, it has to be cleared out to keep water moving. Would it make sense to choose a specific spot and think about how often maintenance has to be done in that spot to keep the system functioning? To keep people going over the bridge? I'm not quite sure how to put it eloquently.

# LRG Workshop Visions for the Future, cont.

**Zachary Libbin, EBID.**

Davena, I think that's a great point, picking the spot. **Like the railroad bridge, specifically, is one that you can really see. They clean it up until you can drive a pickup truck underneath it. And then a couple of years later, you can't walk underneath it. That causes problems with our railroad. The railroad is willing to put effort into that to make sure that doesn't go all the way up and go over the tracks, as an example.** I like your point of picking a spot. Also the actual confluence with the river where IBWC plans to spend significant effort in their river management plan is sort of another location. But the river bridge is a very good example.

**Xochitl Aranda, IBWC.**

This is Xochitl. So rather than starting with ways to measure, I think **my vision is identifying the priority areas—the ones that we see we're having to clean out most often—like was mentioned, the Rincon.** And we've had studies that were done that identified for us nine priority areas.

And so for IBWC, in order to move forward with projects, we first identify the problem areas. Then we prioritize them based on a matrix to identify the different criteria in order to prioritize the different ones. And then, to me, the measure would be, how many of those problem areas are being addressed?

Start with that measure performance. We've addressed two out of nine priority areas. And then the followup to that would be, how often is that having to be maintained? How often are our crews having to go into the river and remove that sediment? **And so**

**I think rather than starting with a volume, let's start with identifying the problem areas and how we can address them.**

One of the things that stood out for me and in the presentation we just saw was the erosion way upstream in the arroyos. I remember in the trip we took, going up to the Rincon Arroyo and where it begins, the earth cutting that occurred there. If we could implement some of those measures, the stone riprap to capture some of that sediment and prevent some of that earth cutting. Because, the earth cutting that we see way upstream in the Rincon Arroyo is what ends up in the river.

Try to address those problem areas but from the source, where we see it begin. And just to bring it all together, I think I would start with, identify the problem areas and then a plan. Let's say a five-year plan: 1. Year one, we're going to move forward with these, 2. year two, we're going to move forward with these two.

And then our measurement is going to be that. It's how many we've addressed. And then we'll continue to improve upon each one based on measuring how often we're having to clean it out. What is the efficiency of what we did. And is that going to work, further downstream?

So I'll give you an example. We did Thurman one and two, the sediment basins, and that was like our pilot project in addressing sediment before it enters the river. And we did see that it works. It captures a lot of sediment and they're full. They were full the first year they went into effect.

**Now the issue we're seeing is that it's only dry enough during one month out**

# LRG Workshop Visions for the Future, cont.

**of the year that we can go in there with heavy equipment to clean it out.** Building upon that, what did we learn? What can we improve? What do we need to implement in any sediment basins that we move forward with? Like the lessons learned.

And because it is a pilot project and we were going to see, okay, will this work in other areas? And how efficient is it in capturing sediment? And how often are we having to go in to the river to clean out? In Thurman one and two, we haven't gone into the federal confluence to clean it up because it has been captured by the sediment basins.

That's my vision, just because of how, we handle our projects within IBWC. How our budget requests are two years out, in advance. And so we have to have a plan in place before we request funds. So for this group, **in order to address all the different issues, I think we have to identify them, prioritize them and plan it out. Then build upon that.**

**Dennis McCarville, EBID.**

Hello, this is Dennis McCarville. I'm thinking that it's very important to capture sediment. However, **if you remove the sediment and the water keeps flowing downstream, it's simply going to pick up more sediment and move it again. So what you need to do is work on increasing the infiltration and reducing the runoff.**

**Connie Maxwell, NMWRRI.**

Sorry, my controls keep disappearing. I'm going to put them one place. Thank you all.

**Sam Fernald, NMWRRI.**

Can I follow up on that point when Dennis is done?

**Connie Maxwell, NMWRRI.**

Yeah. Dennis, is there anything you wanted to add to that? Go ahead, Sam.

**Sam Fernald, NMWRRI.**

What Zach was talking about sediment and Dennis about water, I think that perspective of keeping the sediment, the nutrients, and the water on the landscape, that helps with everything we're talking about. The sediment downstream, the extra runoff that just like Dennis is saying, that's gonna eat up more sediment if it is just flowing water. The nutrients that are good for restoring the watershed, to keep the vegetation and the water on the watershed unless, of course, it can soak in and recharge groundwater.

**So I think this perspective of keeping the water, the sediment, maybe add the word sediment, and nutrients on the landscape.** That is I think it's not really a specific project-based approach at this point, but I think it **summarizes a lot of what would be healthy for the watersheds.**

**Connie Maxwell, NMWRRI.**

Great. So let's combine these two: keeping water, sediment, and nutrients on the landscape to increase infiltration. Would you also say, "promote revegetation" or "vegetation and reduce erosion"? Anything else we'd want to add there?

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## Presentations, cont.

**Dennis McCarville, EBID.**

This is Dennis again. I think you're on track. **Revegetation and other changes to the surface to increase infiltration, combined with spreading the water out**, like you've been talking in other presentations, are probably very important.

**Connie Maxwell, NMWRRI.**

Revegetation and other surface treatments. That's not the best word, but I know what you're saying because the restoration itself will also perform that function. Just like terracing kind of concepts can perform that function. What about other visions?

When we get into issues and strategies, I'll go over some of your survey responses and so forth. One of the areas that is becoming important for the region is the need to mitigate the land use affects of potential future fallowing and even agriculture that's been sold out for water rights.

The watershed health implications of fallowed fields and the watershed health implications of declining groundwater. Aquifer recharge programs can help with that. Anybody want to take a stab at a vision for that?

Alright. Let's go ahead and build this vision list as we go. One of the things I wanted to do was to give you guys a little bit of a summary of some of the survey responses in some of the programs that we're working on right now.

I know folks have, a little bit of a difficult time to stop and do the surveys. We have gotten some good responses so far. We've gotten 19 responses. So thank you all for that. One of the things that I wanted to do was share some of those preliminary findings.

I think it's not surprising that the top priority that people have focused on are the issues of vegetation conditions, productivity, and erosion in the upper watersheds. Coming in at number two: water supply, increased variability, shortfalls, and aquifer groundwater. Number three: a need to increase watershed scale coordination to achieve goals and reduce conflict, including educational and technical support and activities. Number four: soil deposited from upper watersheds. Number five: flooding. Number six: watershed effects from urban development expansion. And number seven: a need for coordinated watershed planning efforts in the Organ Peaks National Monument.

Some of the additional issues that people focused on: riparian restoration, enhancing recharge, rangeland health and restoration, sediment in the Rio Grande reducing its delivery efficacy, improving water quality, decrease in wildlife habitat and habitat corridors due to overall habitat degradation and habitat loss, surface water contamination, pollution, the need to have continual flow in the Rio Grande, allow the Rio Grande to meander and become a living water body as defined by lower amount of diversion, channelization and damming, strategies for stakeholder engagement in water conservation programs, adapting the water system to climate change, securing nature's share of water, promoting environmental flows and habitat resiliency in the watershed, while also tackling issues in water supply and demand, but in partnership with the ag community and municipalities.

Political issues. I'll read this a little more: "Federal land ranchers working with their soil and water conservation districts and the

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## Presentations, cont.

NRCS serve an integral role, but too often face exaggerated environmental regulations designed to be burdensome rather than sincerely necessary and productive. Either well-managed livestock operations serve a well-designed watershed plan on federal lands or they don't."

And finally, "the balancing of economic development, urban water use, agricultural water use and the health of the watershed." Some more voices here to add to the issues. The strategies that we identified, all of them got a fair amount of support. The question was, would these strategies directly or indirectly benefit the respondents?

Some of the strategies that were identified early on in our planning process were: expansion to the early warning systems to get better data and better warning for flooding, schematic plans—as we were just talking about—for low impact watershed restoration practices to slow and spread flow, plans for adapting flood infrastructure to capture sediment and water supply, expanding the aquifer recharge network, continuing the Rincon Arroyo watershed planning, a decision support model for land managers to predict the effects of different scenarios, planning and regulation to anticipate and mitigate future development pressures on watershed processes, critical flooding areas emanating from the new monument, and watershed educational and technical support programs to engage local youth and community organization.

So one of the top ones here was "developing the plans for our upper watershed restoration, low impact practices." One of the projects that we do have funding for, that hopefully we will start soon, is the Reclamation Drought Response Program.

We will be looking at the potential effects of these different strategies. What it will enable us to do is, as we look at how the water budget functions in a watershed, we'll be able to say how much of these different strategies do we need in order to achieve a desired effect, like recharging the aquifer.

So the idea with this decision support tool that we have funding to proceed on is that we'll be able to look at the water system, as one comment mentioned, and manage the water budget itself. So you see here a very simplified version of a water model, which really talks about these natural processes. On it are some of the results from NM WRRI's Dynamic Statewide Water Budget model, from 1975 to 2018.

You can see a lot of variability of surface water. And this is just change in groundwater aquifer. A lot of variability. So some recharge in some years and some depletion. So we'll be looking at these in terms of this decision support tool and saying, so what are the potential effects on the groundwater itself?

So we'll have a strategy to add upper watershed restoration at recharge zones. Mountain fronts are good recharge zones in the uplands. And certainly, of course, the valleys, ditches and fields that are next to arroyos enable us to increase recharge. Decrease of evapotranspiration through water-low-efficient crops, efficient practices capturing and spreading flow. These are the sorts of strategies.

The conditions of our groundwater in particular, as Zach was mentioning, are very difficult to quantify. If we look around the state, of course, the upper basins have less of declining groundwater issues than we do down here in the south. In the middle Rio

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Grande, when in 2008, they started getting San Juan-Chama water, you can see that groundwater decline trend reversed itself and started to become more stable. The Mesilla basin has had different challenges. And of course the Hueco-Bolson basin is significantly worse. But actually measuring those levels is difficult, as many people are intimately involved right now with the lawsuit.

This is the USGS Mesilla basin observation network. Generally speaking from the last water year, you can see that the red indicators are that the levels are much below normal. So these are ones that they're just watching. You can see that the level in the last year of this particular well is all within the much below normal.

The network is quite extensive. You can see the blue dots here are the network dots. The red dots are our agricultural wells in the valley itself. One of the reasons why it's so difficult to measure is due to the amount of wells themselves. And you can just see the amount of noise that's occurring within the wells.

Certainly, when pumping occurs, there's an enormous amount of depletion. So these trends are bumping around this particular number 30. These are all wells within that watch area as well. The trend is a little bit more clear. And then here, in all of these are wells that are currently much below normal. Even in this, the trend is difficult to actually see.

So, managing the water budget isn't an easy thing, but it is certainly worthwhile in terms of a challenge. So my last few comments before we go to really trying to look through these issues and strategies are some of the

strategies that have been discussed.

We know that watersheds are fundamental to the infrastructure for our region. California actually passed a law in 2016 that recognized that because watersheds are the source of runoff, they're recognized and defined as integral components of water infrastructure. It made things like upland vegetation management to restore the watershed's productivity and resiliency, a restoration of meadows, roads, and stream channels eligible as key infrastructure.

We know that there are federal infrastructure bills going forward that will likely enable us to garner funding for these type of efforts. And there are several key areas there. We also know that the ISC is in the middle of a pilot program to pay farmers to stop groundwater use. This is what's known as an ecosystem service payment, where the ecosystem service of less groundwater pumping and maintaining groundwater levels is paid for by the state because there is a general benefit. The best example of an ecosystem service program is when New York City helped farmers and its upper watershed regions do sustainable practices. They spent about \$1.5 billion, but the estimated alternative costs for a water treatment plant was between \$8-10 billion. So it's cheaper to do the right thing.

One of the questions is, what pilot programs would we recommend? As Xochitl mentioned in this vision, let's go through, identify our priority areas, our priority strategies, let's estimate what sort of effect they can have, and let's plan for them. That's one of the questions.

Just a few examples of managed aquifer recharge programs. I like this one in

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## Presentations, cont.

California where you can see the fields. Several of the fields are now turning into riparian areas and definitely areas that are targeted for aquifer recharge. California does a fairly engineered approach. And in Albuquerque there is an infiltration pit.

We've talked a lot about upper watershed management to spread and slow the flow also down in the fields as well. Finally, these fallowed fields, where we could be putting arroyo flows on—particularly in our region—could also be put to productive use through cover crops or through different crops. For some of the farmers that want to fallow their fields, perhaps those fields could be eligible for new high value herbs and medicinals things that would require almost no water. We want to be working with the ISC or other funding agencies to expand these ecosystem service type of programs. That includes water efficient practices. You can see cover crops here, and these are all in this particular region.

To end, we have a number of potential funding sources and existing funding sources. I'd like to ask Sam to tell us a little bit about a new funding effort, and Patrick to talk about some potential efforts as well.

We have the drought response program, which I went over briefly. EBID will be expanding its aquifer recharge network. We have a number of NMED watershed implementation programs. So we have the ability to look at how effective some of these watershed restoration programs are. We're working with the New Mexico Interstate Stream Commission on their 50-Year Water Plan and collecting visions and strategies.

After this meeting, you guys will get a chance to review this. And, certainly if you

want to pull something, that's certainly possible, but we're going to be developing an independent NM WRI report that really tries to capture your visions and strategies for the future.

We're doing that in different parts of the state. These visions will then potentially contribute to that 50-Year Water Plan as your visions. So I'd like to end here and ask Sam to say a few words about this very new recently secured grant, and then ask Patrick to say a few words about his perspective.

### Sam Fernald, NMWRI.

As I'm getting my slides up, does anybody have anything to say before I start the presentation. Perfect. I'm just going to run through a few slides quickly, and this is my vision. We just published a paper showing recharge in New Mexico has actually started declining since the nineties, meaning lower precipitation, higher evapotranspiration and less replenishment of groundwater.

If you look at the Doña Ana county water budget, this is from a water statewide water budget tool we have. It's interesting because note that in the lower Rio Grande, our surface water depletion started going down in the nineties and groundwater depletion started going up, even though there were big increases in 2000 with drought, and again around 2011.

So what happened? As Connie pointed out, we've seen groundwater dropping in some locations and I wanted to point out some efforts we have for water budget resilience. Really looking at the quantity side, even though quantity and quality are intricately linked. So I just wanted to point out a few of these -

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## Presentations, cont.

Of course, watershed management for increased recharge. I think that's a big focus of this group today. Adding water with desalination, innovating with irrigation, reducing demand, coming up with strategic tools for demand reduction, seeing what communities' resilience-brainstorms can tell us. And then this project that Connie wanted me to point out.

I really think we need a suite. Hopefully this leads into what Patrick's going to talk about. I think we need to really look at the big picture and throw everything we can at it, but also try to have a united front that brings these watershed programs together with all the other things we can do for water for the future, and the lower Rio Grande.

I think all of these efforts are important and I will skip now to the latest one, which is a project with UC Merced, and it's acronym is SWIM. And the idea is a resilient water future through measurement, management, and market. The three main sites are Central Valley, California; Utah; and the lower Rio Grande, New Mexico.

The great thing is, it's looking at states where we have this surface water and groundwater connection. It's a brand new, \$10 million project, that just got announced last week. And NMSU is one of the three leads in collaboration with these other institutions. We got \$1.6 million for NMSU to really invest in basically trying out some resilient future approaches.

So everything that we're hearing today and in the future, we'll hopefully be able to put together some examples, some real beta tests of how to put all of these efforts together and make a difference for the water future. I have two other slides. One of

them depicts, you see here, the Southwest Climate Hub. We're working with that group out of USDA-ARS in Las Cruces.

With the three test beds in California, Utah, and New Mexico we're using a lot of great remote sensing for measurement and onsite measurement of soil crop water budget working with the faculty at NMSU and the researchers at the Water Resources Research Institute. The big management aspects that this project is focusing on are aquifer recharge and water banking.

Utah actually already has an up-and-running water bank that we'll look to. And regarding the lower Rio Grande and California, they're really important for ways to look at multifaceted aquifer recharge programs. One more slide on this project. The idea is to link across scales, get the detailed information from our farms and individuals, and then integrate these at the regional or district scale.

Again, recharge is a big aspect of it. We'll see if we can come up with some modeling approaches to provide decision support for the region. We can help the Interstate Stream Commission, EBID, the various agencies come together with some actual on-the-ground approaches, and we can quantify not only the recharge, but the implications for the agricultural industry, the ecosystems, and the community.

The hope is that this will be a model that can be used elsewhere and really help the USDA with some of these sites where we have coupled surface water and groundwater systems. That concludes a brief description of the program.

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## Presentations, cont.

**Connie Maxwell, NMWRRI.**

Thank you, Sam. Any questions on that particular program? I also asked Patrick McCarthy to give a few words about some of the thoughts that he is bringing from the Thornburg Foundation. He has been working with NMSU, with Sam, and now myself and others. Patrick, do you want to give a little introduction?

**Patrick McCarthy, TF.**

Thank you, Connie. I'll just say a few words about the the exploration we're doing right now with Sam of the Water Resources Research Institute and New Mexico State University. These ideas that we're exploring were inspired by some work going on in the Colorado River basin having to do with looking at how we can address these intersecting problems of water security, food security, agricultural economic viability, and essentially the sustainability and resilience of the water, climate, and energy system in the Mesilla and Hatch Valleys, the lower Rio Grande, of course. And how we can address those in an integrated way and bring resources to the table, federal state, and even private resources through corporations, perhaps through foundations like mine and others to achieve a vision of resilience for the valley.

Now that being said, clearly there's a lot of other work going on that we need to learn from and find a place within to figure out whether our efforts collectively can really advance and enhance the many initiatives like this one, that Connie you've described to us this morning, and like the one that Sam just described as well.

So clearly there are resources and a lot of interested folks and energy going into

this area already to address this looming problem. It isn't just looming, it's here already. Climate change driven ratifications and a supply and demand imbalance in our water systems, plus watershed degradation. The idea here is to bring folks together to identify what I think of as an optimal suite of strategies of the nine or ten strategies that are laid out in that document that I linked to in the chat, coming from that source work that was done by Culp and Kelly and others. Take a hard look at those.

Clearly you all, the science and management community, are already identifying and, in many cases, already implementing these strategies. The question is, where and how can we implement them to best effect? And of course, how can we fund them at a scale that's really going to make a difference?

This is perhaps the biggest challenge. Just as the Rio Grande Water Fund has looked at how to accelerate and scale up forest and watershed restoration in the middle Rio [Grande] all the way up into Colorado, I think the challenge here is to figure out how to expand the resources and expand the sort of synergy and alignment of all the groups working on on these efforts to build resilience.

So the idea is not only to use science as a foundation to the evidence-based, to identify that an optimal suite of strategies, but also build community support across sectors. Not only the various water users, but also economic sectors in the community. Bringing folks together from the private sector and municipalities and, of course, water managers at multiple scales, including ag and municipal water managers. To develop a program or programs that might look something like a regional demand

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## Presentations, cont.

management program, combined with an agricultural water resilience effort that would be deployed over years to achieve this supply and demand, and improve water quality and quantity in the region.

Let me just say that we're really just beginning to explore this now. It would involve mostly bringing folks together, as I say, from multiple sectors and parts of society to reach agreement on a problem. Then set solutions and bring some funding, some resources, to the table to make it happen. So I'll end there.

### Connie Maxwell, **NMWRRI**.

Thank you so much, Patrick. So as you can see, there are a number of funding programs that are supporting and potentially will further support a lot of our efforts. So with that, I'd like to open up the floor to us talking about these issues and strategies. I've got Google Earth open for us to actually identify where some of these issues are and to start to prioritize.

With that, if you have any questions for Sam or Patrick or myself, certainly raise them. I'll start with, in the chat, Davena, you mentioned thinking of visions that some of the visions would go beyond. I would say, if there are any particular visions that people have that require a different year, by 2050, or a climate change vision by the end of the century, certainly please throw those in.

Any time another vision comes up let's throw that into the list. We listed some of the issues and strategies. Anything that people want to add in terms of those issues and strategies? Or we can just get started with talking about the the ordering of how we want to approach these, where do we

want to do these pilot projects? These priority first steps—what are some of our highest priority areas? So I'll open up to the floor. But I will also say, Davena, is there something you want to add from your chat, or that I haven't captured from all the chats as of yet. Would anybody else like to add, as well?

### Davena Crosley, **NMED**.

I don't have anything else right now, but that kind of opens it up to where I'm not trying to come up with something that's achievable in one decade. Thank you for clarifying that for me, Connie.

### Connie Maxwell, **NMWRRI**.

Yeah. And I think your point about interim steps as well is important. We really want to be thinking about what's our short term high priority items that we need to deal with. What's our medium term we know we could make quite a lot of progress steps on? And, you know, what are our longterm visions? So issues and strategies and any more visions? Or even just, what should our next steps be?

### Will Barnes, **NMSLO**.

Connie, this is Will Barnes from the land office. And I'm sorry that I was not able to join early on. One, and maybe you've already talked about this, but really briefly one vision is a kind of an **economic and community resilience, integrated with ecological resilience. Just that sense of the human community being integrated with with the land community.**

**So just as a vision for how we do land management in the future. And the**

# LRG Workshop Visions for the Future, cont.

**collaborative requirements that are necessary for real resilience.** I would just throw that out there.

## Connie Maxwell, NMWRRI.

That's great. In keeping with the discussion about issues, I know that on one particular meeting that we had with BLM, we started to identify real hot spot areas. And I know that Dennis has developed a survey tool that would enable us to capture that more. I think that's one important aspect. I did hear one comment, which I thought was really useful. And when we talk about prioritization, sometimes it's difficult, cause it seems like we're saying one area is more important than another. Sometimes that's misleading because we need to be working on two things at once. But maybe think of it as really our sort of action plan and the ordering of what we want to focus on, which can have concurrent efforts. Issues, hotspots, what are your organizations facing?

And if those issues that have been listed so far and captured by those survey are good, then what are more of the sort of hot spots and places that you want to start? Where do you want to do the next pilot project?

## Zachary Libbin, EBID.

So Connie, from John Gwynne at the flood commission's perspective and EBID's perspective, with the existing flood control infrastructure, as it's been relatively well covered, **we have sedimentation issues that impact costs of providing flood control. Sediment is reaching flood control structures**, especially John has some of these serious issues, where they have dams that are pulling up sediment way too fast and need some upstream

efforts, like the one that we're talking about today and in other times. It would make a huge difference to their ongoing costs, to what is really similar to what I've mentioned, as a vision: finding ways to improve that upstream watershed health, the resilience or improvements to keep that sediment in the water up on the watershed.

## Connie Maxwell, NMWRRI.

Great. Thank you, Zach.

## Xochitl Aranda, IBWC.

I can add to that, Connie. From past experience and observation, when we do have localized flooding, it's due to the flood control structures that are in the communities. As far as the levees on the river and making sure that the flood capacity is maintained and removing sediment from the river channel in order to do that. That's for a design flood. That's where a hundred year storm that flows in the river and that's to keep it from flowing into the adjacent properties. And of course we want to make sure it's clear, so that any runoff does enter the river without any obstruction. **But when we do see localized flooding, it is because either the drainage channels or retainage ponds are filled with sediment and do require much more frequent cleanup and maintenance.**

## Connie Maxwell, NMWRRI.

Thank you. That's an important nuance that the localized flooding is directly due to the flood control infrastructure being filled with sediment. Or the flood control system. Some of it. The river is obviously part of the system.

# LRG Workshop Visions for the Future, cont.

What do you guys think about the idea, as we're going forward and talking about this as a campaign; I think the particular process that we're following is very much as Xochitl described. And I don't think I mentioned this particular slide itself. One of the things that we want to do is keep building these visions and goals. Because that really is what guides all of our process. We are building this collaborative network of partnerships across the landscape. We've obviously made quite a bit of headway. Then we're doing the knowledge and evidence building and exchange where we're characterizing the critical dynamics of the ecosystems and the communities that rely upon them.

And I think at this point, one of the things we really want to focus on is, what don't we know that we need to know? What more do we need to study? As Zach mentioned, and as is clear from looking at the groundwater systems, it's not so easy to really characterize what is happening with the aquifer itself.

So that would be a good gap that we want to work together on to make sure that we really have the most complete understanding and the best data to understand that. And then what are our triggers for action, much like a drought plan would call for? And then in every action, as Xochitl mentioned, the adaptive management component, we learned from everything that we do, and that gives us more knowledge and evidence. And it gives us the ability to assess the capability of these different actions to achieve the visions that we're describing. So given that as our process, different organizations have made commitments to this effort. BLM has been working on the priority project of the Rincon Arroyo, that the Stormwater Coalition identified. Perhaps, in your organizations, you could describe what commitments

your organizations have made to date to addressing watershed health.

And then that could be part of how we start to work with producers. And when we meet with focus groups and we talk with producers about their perceptions and issues, that could be something that could be highlighted.

**Sam Fernald, NMWRRI.**

I have a thought, but I don't want to hog the floor if somebody else wants to go. So when there's an open space, I have a thought.

**Connie Maxwell, NMWRRI.**

Go ahead, Sam.

**Sam Fernald, NMWRRI.**

Basically I'm just reflecting on the watershed, because I think maybe we heard about the importance of project assessment on the ground. What's being done to go through some of these problems spots, which I agree is a great way to actually make a difference, especially when you start up in the watershed, because that's so important. Because if you don't start up at the top and you try and do a big project down in the watershed, you can still get wiped out by that flood that happens because your watershed isn't healthy. But then I'm remembering, Connie, some of the work you did to show the priority areas. The most recharge, the most amount of water that can be spread out on the landscape in many cases is where that runoff is concentrated farther down the watershed.

So I'm thinking there's room for everybody here to be looking at what's happening in the

# LRG Workshop

## Issues / Strategies

*Question: What would you say are the biggest issues and challenges that your organization faces each year? And what solutions do you think would address these issues, or are worth trying? And what barriers are there to instituting these solutions?*

channel where we have the most impact, and what's happening up on the watershed, where we have the most chance of doing a project on the ground that actually heals the watershed. That's why I didn't want to interrupt anybody else, but I think as we're prioritizing, thinking about the place on the landscape, and that also extends to the valley where all these other things are happening, might be a way to think of our watersheds.

It's a little different than what we heard about with the Rio Puerco obviously, where one of their biggest problems is sediment off the watersheds, and that's just one of the issues we have here. Watershed management is, of course, different without as much forest as they have in the Rio Puerco.

Some of the thoughts about looking at the watershed, having these multiple objectives is what I was trying to get to. Spreading the water is going to be most effective where you have water that can be put on the floodplain. Healing erosion, that's going to be most effective where you can get on the ground and have a project that heals the erosion.

**So that might be a way to prioritize these multiple efforts to have multiple objectives. Thinking of the watershed scale.**

**Connie Maxwell, NMWRRI.**

Yeah, I think that's helpful. It is true that when we go out onto the landscape and look across the landscape, particularly in

terms of upper watershed restoration, it's overwhelming.

We remember from our field trip from the Rincon Arroyo, the Rincon Arroyo watershed itself is 135 square miles. Where do you start? So one effort would be to look at where we have the opportunity to spread water. As you said, Sam, I think that's an important objective. And we can apply the study that I did on the Rincon Arroyo to the rest of the Hatch and Mesilla Valley.

One thing I found was, like you're also saying, addressing erosion where you can access it, but also trying to really document all of the hot spots that you guys recognize. I think we can go in both ways. Where do we have larger floodplains where we can spread things out?

Some of those areas might not be that important because they are spreading out and therefore you don't have erosion down below. And so then you come out from the other end as well. Where's the problem occurring? And then look upstream from there.

**Davena Crosley, NMED.**

Connie, as far as prioritizing projects, **it makes sense to me to look, as you were just saying, where the problem areas are and look upstream from that.** And as Zach pointed out, places where there are safety issues, where there are dams that could blow out. We know that there's a problem in the entire watershed.

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## Issues / Strategies, cont.

As you were saying, it's just overwhelming. So **maybe prioritizing safety areas would be one way to try to narrow it down.**

**Connie Maxwell, NMWRRI.**

I think that's a good point. Where there is a safety issue, that's probably a good indicator for multiple upstream issues. Yeah.

**Zachary Libbin, EBID.**

And Connie, to add to what Davena is saying, go a little bit further down that path. Some of those hotspots, I could list the ones that come to mind for me, but two examples are **the Placitas Arroyo and the Rincon Arroyo, huge watersheds. They don't have any flood control structures on them or sediment control in the watershed. But addressing the issues in the watershed would both address sediment, water issues, improve safety like Davena was saying, and also reduce costs.**

So the Village of Hatch is looking at \$60 million for improving the banks of the Placitas Arroyo to protect Hatch. If a few million dollars of upper watershed work could reduce their costs by more than that, we should definitely be looking upstream rather than downstream for some of those solutions and similar for some of these dams.

It would be hard to justify to go too far into the engineering realm, reducing the size of the spillway for a dam, because we're going to do something in a watershed that we hope will last, probably won't get all the way there. But the Placitas Arroyo and the Rincon Arroyo, using those as examples, where there the flood control aspect of those is super expensive and upstream efforts

would probably pay dividends compared to what they had to do downstream. And they're really similar—we were using John Gwynn's dams, for example—these dams that I think you've mentioned that if you clean out the sediment, more just comes right back in. We're not thinking enough about the upstream issues and keeping the water and the sediment on the watersheds. But those watersheds with existing flood control, those costs could be better spent upstream rather than always addressing them over and over again inside the flood control structures or the associated arroyo or whatever it is. Again, with the Placitas, that brings in a ton of sediment to the river so there are costs of the river there are maintenance issues within the channel itself. And there's probably some ways upstream that we could reduce those costs of the flood control and the maintenance just by improving the watershed health. Although noting that those two examples are huge watersheds with huge issues, but just using them as examples too.

There's upstream work that could pay dividends for health and safety as well as maintenance costs.

**Connie Maxwell, NMWRRI.**

Great. Thank you, Zach. Other examples of different areas in the watershed that are good examples for some of the issues. Xochitl, you'd mentioned you had a list that IBWC had identified a list of priority areas.

**Xochitl Aranda, IBWC.**

I do. Let me pull that up and I'll share with the group. Unless Liz knows them off the top of her head. I know she's worked this for a long time now, but let me grab it while she's doing that.

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## Issues / Strategies, cont.

**Connie Maxwell, NMWRRI.**

And any other issues. I know Jessica, you had given me a little bit of background on some of these issues that Rusty and Jessica and John and Zach, you guys had talked about, all within the west Mesa itself. Little Holla, La Union, Gardner Dam and then even issues up here at Butler-Cothorn where there are issues with these two small structures and the NMED watershed implementation project was just approved by APA not kicked off yet, but we're getting close to that being kicked off. The city identified several areas where green infrastructure would be helpful for dealing with arroyos within the city itself. There are several areas there that are in that project.

**Jessica Knopic, BLM.**

I feel like up in the valley, you can find large watershed problems, anywhere you throw a dart and maybe we need to decide what values to prioritize off of. **I think safety is always going to be a critical value. Maybe review the programs we already have and other agencies have started. And what re-progress ahead in certain projects. And make that a project priority.** When you were talking about the city's urban infrastructure, we're looking at trying to look at doing more reports for Alameda Dam to figure out if Alameda Dam can be modified to improve safety, as well as that green infrastructure with the city.

**Connie Maxwell, NMWRRI.**

Where is Alameda Dam? This is Las Cruces Dam, right?

**Jessica Knopic, BLM.**

Beside Oñate High School, or south of

Oñate High School.

**Connie Maxwell, NMWRRI.**

Oh yeah. Not being a Las Cruces native, that's tough. I'll add it later. Alameda Dam. Okay.

**Jessica Knopic, BLM.**

So just east of the Las Cruces Dam.

**Connie Maxwell, NMWRRI.**

Gotcha. I think that point that you're making, that the issues are throughout, I think that's a really important point. So there's two things that I think stem from that. You were saying review the programs that people have enacted. That got a little bit garbled. Was there something, programs, that different agencies have started and look at what's in front of them? Was that the point? Jessica, can you hear us?

**Jessica Knopic, BLM.**

Yeah. But **I feel like every agency has programs and every agency has things they are trying to do, but we're all limited.**

And so the goal of this is to come together to help, build this network and this working group and to achieve bigger things. And maybe we need to understand as a group, what other agencies have in their pockets already, but the maybe need help with. I'm sure road maintenance is already something everyone's doing, but we need help with doing it in a way that we're eliminating soil erosion.

**Dennis McCarville, EBID.**

Hi Jessica, this is Dennis again. Expanding on

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that, if you look at what they've been doing in Northern New Mexico, with the thinning in the forest and that type of thing, the amount of resources they have managed to come up with and the boots on the ground and all the labor they've done. If the similar amount of effort could be made down here, I think you would see some really big changes.

**Jessica Knopic, BLM.**

Yes, Dennis, I agree. I think we're all on the right track. And I think we all have the vehicles already in our offices to hire boots on the ground. We're just missing some of the large goal: to ask for funding, so we even know what to ask for. And maybe the small detail of the personnel that can actually manage a crew on the ground. But we all have vehicles in our jobs where we could do a lot of work.

We just need to see that overarching goal and how we can put our little fundings and contracts to the big goal. Possibly when we all have things already, if we had a little bit of help and a little direction, we might be able to point it all in the same place. So you get a big outcome.

**Connie Maxwell, NMWRRI.**

I'm hearing two visions from both of you guys. In particular, Jessica **build a network and a working group to achieve bigger things**. I think that's a good vision to start to achieve our goals on the scale of the region, maybe our goals right now feel like objectives, but, if we thought about it as the whole region, it is a bigger goal, a bit bigger vision. And then Dennis, **build a well-funded campaign?**

**Dennis McCarville, EBID.**

If I could help you out here. There is the New Mexico Watershed Land Owner's Coalition has been funding efforts towards watershed repair up there in the north, and they take their grants and they leverage those to get even more money. They have been able to do quite a bit of work.

**Zachary Libbin, EBID.**

So I think what Dennis is talking about is the **Rio Grande Water Fund**. And those guys are also interested in talking to us about efforts that they can do in our area. I think that's a great point. Dennis says those guys are experienced leveraging funds, and there's definitely ways to leverage funds and get outside support beyond the obvious. And those guys have some really good experience with sort of the NEPA side of things. In summary, they've helped with NEPA for the Forest Service, such that they can focus their efforts on actually getting the prescribed burns or whatever thinning or whatever it is done when the NEPA seemed to be the stumbling blocks. They paid for the NEPA, accomplished that work through the Forest service, or I think with most of the Forest Services. They were able to get them off of center and help them get those projects actually going.

**Jessica Knopic, BLM.**

That would be fantastic. And I'm also thinking that everyone is already accomplishing tasks on the watershed and for flood control that maybe we just need to know what to report for you to track widgets that are already happening in this network group. I think if we started putting all the

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## Issues / Strategies, cont.

little things together we do. We would have quite a list of widgets that we are already accomplishing.

anybody imagine the cleanest, easiest way to do that?

### Connie Maxwell, NMWRRI.

Yeah. I think that's a nice objective that would contribute to the building of this network. Because I remember one thing you and I talked about was **if we knew everything that each other was doing, then we would also start to see where some of the things that we're doing can help each other.**

**And that coordinated effort then becomes that much stronger.**

### Jessica Knopic, BLM.

An example on that is I remember being in a meeting in T or C where they mentioned that the city or county maintenance, when they clean out a culvert are just now letting the local BOR know. And so they're going downstream behind them and cleaning out the entrance to the river in the same schedule order.

And that was just a matter of someone pointing out that they needed that communication and they're all willing to get onboard to do it.

### Connie Maxwell, NMWRRI.

Yeah. Does anybody have a visualization of what that might look like? I know that there was someone, I think it was an Army Corps individual, and he was going to actually give us a presentation of that at our Stormwater Coalition meeting. Like in drought projects, sometimes there's impact reporting. That sounds like it's a lot of work and somebody would need to be paid to manage it. Can

### John Gwynne, DACFC/SC.

Connie, this is John. Nice to see everyone or talk to everyone. So that was Bruce from the Army Corps and what he's was talking about is the GIS-based mapping system where individuals can go out and on their cell phone, mark locations and add photos and other comments for things that are happening. And you're right, that would take some effort to set up and some effort for someone to track and monitor and update so the formats all work. But yes, Bruce is still planning to do that. We just have to get him scheduled. He thought it would be better for one of our in-person meetings.

And with COVID still an issue, travels are still limited for some folks. We're still waiting to see, to get that set up.

### Connie Maxwell, NMWRRI.

That sounds great. And that sounds like that would be really helpful with some specific items. I wonder as well. This idea had come up and I think it had come up when Jessica, you and I were talking. I think you had mentioned this idea before that people are doing a lot of efforts already.

What do you guys think about the idea of me sending an email to all of your organizations and asking you what current and future commitments has your organization made towards watershed health and would consider making. And that might accomplish two things.

One is, it would give us an ability to see how people are currently connected. We could

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do a little bit of a map of, whose responsibility is what, and what are the commitments that are being made. As well as, it would give a space for organizations to brainstorm about what additional commitments could be. What do you guys think about that idea?

### Jessica Knopic, **BLM**.

I think everyone online feels that they're the ones that would have to fill that form out. It's another workload for us.

My only thoughts on that, when we talk there, we are talking big goals, longterm environmental goals, resource goals, watershed goals. But when you're asking for these projects already, are you asking for small things? Who do you ask for when I want to know when you do culvert maintenance, or are you wanting to know the commitment we've done for watershed health, like the large commitment? BLM has committed to watershed health through our programs and supported this. Or are you looking for like a whole laundry list of things?

### Connie Maxwell, **NMWRRI**.

I think the former, the the overall bigger goals so that we could include it in this watershed plan. And it could give an idea of what different entities are already doing what. But it would also help give us a little bit of research to map out how the different organizations are connected.

And I think the idea of efforts that are detail oriented on every little effort, I think that's going to need some thought because we really want to make sure that we understand what the objectives are. Like, the example that you gave of one entity being able to

see the activities of another entity and therefore follow up. I think we'd probably want to target that. And talk about that one a little bit more. So I was thinking bigger goals, bigger visions.

### Will Barnes, **NMSLO**.

Hey this is Will from the Land Office. A couple of things. I think we might start smaller with just a meeting like this, where everybody is just meeting and you get a regular opportunity to hear what's going on and who's doing what. **Just as an example, the Land Office is meeting monthly with the Last Cruces BLM, and we just spend an hour a month and share joint projects that we're doing together.**

**And it's been incredibly helpful just help us both know what the other is up to and how can we collaborate, to get things done differently and better. So perhaps a face-to-face every once in a while conversation like this would be really helpful.**

It also sounds like you're thinking of kind of a portal or a location that we could go to to find out what other people are doing. And I think those generally work okay, as long as people use them. But they get to be old and it's hard. You need to have somebody to keep them up.

And so I'm not sure that can ever really replace the getting together and actually talking about what we're up to. But those are just my thoughts,

### Don McClure, **BLM**.

And then let me expand on that a little bit. In some ways that was where the Stormwater

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Coalition started is getting together to share what we're doing and to see how we can coordinate activities together and help others. I think that's still a target for where the organization would like to go, is make those meetings part of doing that.

Obviously COVID has made those things more difficult, but I think it's something that would really help us to understand what each institute is doing. Because I can tell you just from working with Zach and in the flood commission, if you just put the two of us together, we have things that we're working on north, south, east, west everywhere throughout the county.

And we intersect all over the place. And so even with the BLM folks we do the same thing. We have projects everywhere, and we intersect with them. I think it would be very helpful to continue that sort of conversation. I think the Stormwater Coalition meetings is a good place to do that.

### Connie Maxwell, NMWRRI.

Yeah I agree that the Stormwater Coalition has done a great job of bringing people together and starting to accomplish that goal. I think that's something this project is: a Stormwater Coalition project, and it's occurring because we've all come together. I think one of the questions, John, and others as the Stormwater Coalition, playing a really great collaborative role in the region, any ideas on how to improve that or how the organization can help further that?

### Don McClure, BLM.

I know that the Coalition is working on revamping itself in order to keep up with all these efforts that we're doing. Part of it is

reassessing the organization itself in terms of bylaws and who are the main member entities in all the key strategies that puts it together.

I think that's going to be continued and an ongoing effort from now until forever. I think that's part of what will, as this project moves forward, help to reinvigorate some of the membership that has dropped off. To keep everyone in, to keep everyone interested, but also to energize them for the organization, being able to help others. Because let's face it, since we work with BLM and we work with EBID and the state Land Office, we're probably a little more fluid with those entities than say the Village of Hatch. So we may be able to help make those introductions and help make those things work for the places that can.

**But I think that sharing projects and showing how all of those efforts compound over time is what will really show evidence of what we're doing. Not just having conversations about them.**

### Connie Maxwell, NMWRRI.

I think we've started to build a nice kind of list of visions. I think we've got methods here and in some of the kind of nuanced areas. Any other visions for the future that folks want to add?

### Will Barnes, NMSLO.

There's something I've been wanting to say. I'm not quite sure where, or how, this fits, **but one of the themes I think is there's a scale there. Scale problems. There's a scale issue here about how we use, how we address the problem. It's easy to spend**

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## Issues / Strategies, cont.

**money on a single point, and those tend to be more expensive, but you can, as an agency, just say, "Hey, let's throw money at this and fix the dam or whatever." But that's a single place. The problem with working in the upper watershed is that it's really a diffuse problem.**

And it's a lot of little bitty structures that you want to do. And it's grass. Those are much less expensive maybe, but they're spread out all over the place and they require a different kind of maintenance that's maybe more annual rather than decadal or something.

If we can start to think about how do we think about scale because we need to work at both scales. And how do we really integrate long-term maintenance into our thinking about these projects? It's easier to do a big dam fix and walk away for a long time than do the watershed structures that you're talking about in the upper scale. And you need to go back in there and work on those on a regular basis.

**So that implies engaging a longer term sort of community training effort. Who's going to do that work. Where do you get those people? How do you build the maintenance of those structures into your grazing practices? So that it's part of the people that live there need to know how to do this, and it needs to be part of what they do.**

I think to be thinking about training, to be thinking about integrating this work into the long-term scale of the life of the community, those are things that we have to wrestle with. I think one example is the Land Office has at least two of those work project dams east of Las Cruces that were given to us by WPA in the thirties.

Nobody actually owns them, but they're on our land. Nobody's maintained them ever as far as we know. And so they're a big problem and we can't fix them by ourselves. So we have to find a community approach to that. That's just an example of something we're settled with that we have to figure out. That's my thought. How do we integrate the scale question. If we really want to fix this in the upper watersheds, we need to find ways to get the communities involved and have it be part of the community. Maintenance of that landscape.

**Stephen Scissons, USACE.**

Connie, this is Stephen Scissons with the US Army Corps of Engineers. Can you hear me?

**Connie Maxwell, NMWRRI.**

I can. Thank you, Stephen. Sorry. I don't know how long you've had your hand raised.

**Stephen Scissons, USACE.**

Yeah, it was virtually getting tired. No I just wanted to offer a few comments. And on the dialogue, of course, that's been said by many folks and underscoring this watershed concept.

We saw a lot of this and continue to see a lot of this with the Army Corps when we do a lot of our bigger projects. One example is I know, obviously the focus is in the Mesilla Valley and Southern New Mexico, but, just underscoring it. And a lot of folks here get it. Colorado Springs definitely had a big impact in its development in terms of Pueblo, Colorado. Pueblo, Colorado saw a lot of that upstream effects and how it's been

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dealing with its sediment management flood conveyance. So obviously there's a lot of examples like that to be learned, in terms of development. And then on the other side, in regards to the nature of the natural environment, our wildfire experience at the Army Corps definitely has had an impact in the way we look at watershed scale problems, right?

Santa Clara Pueblo, for example. We all know Santa Clara being out there with the forest managers and talking about planting a million trees over the next 20 years. How doable is that? Things like that, you got it, Will. That's exactly right. **Scaling these problems in terms of what is it going to take at the watershed level?**

Because you've got guys like Zach and John handling it down at the terminus point, and how is that balance all achieved in regards to what the outcomes that the coalition is trying to get to? It was obviously that watershed concept. I don't think can be any more underscored. It's definitely a priority that the coalition needs to be seriously thinking about. And then my other question, related to the ability of the Coalition to carry out lobbying efforts. And full disclaimer, we always say this at the Army Corps, we can't lobby for anything.

We more or less let local communities and others lobby for funds and things like that. But as a coalition, and I think Zach has some great examples with New Mexico Dam Owners Coalition, and John, that the voice of a coalition like that in Congress is probably a bigger voice than smaller communities trying to hit up their rep or state rep.

So, what would be the goal of the Coalition

as a unified voice to obtain funds for some of these larger scale problems? Because you're easily in the millions of dollars in trying to address these concerns. So those are just some of my comments, Connie. And I'll stop there.

### Connie Maxwell, NMWRRI.

Thank you so much, Stephen. One of the things that we had started to envision, and I remember having this conversation with Angel Montoya a long time ago and saying, it feels like we need a crew for the region. Like the golden gate bridge. A crew of folks goes in and does watershed restoration across the region and just keeps going. And it goes back and does maintenance when it's required and so forth. That might be a nice target for funding. That the crew be large enough. That the crew have priorities to integrate youth. I remember, Angel, you had made the point that the involvement with the Soil and Water Conservation Districts would be a really nice structure.

Certainly they play a leadership role. And we heard Ed talk about the crew that was run through BLM. What do you guys think about that idea as a focus?

### Angel Montoya, PFW.

So I have a comment coming. This is Angel again. The thing that I keep hearing from this group, and it came out with some of Zach's comments, is **how do we reduce recurring maintenance activities by building a healthy watershed; ecologically and economically, because it's got to benefit everybody in the big picture for it to work.**

I think it has to benefit everybody. And I think you bring up a good point. I do see the Soil

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and Water Conservation Districts as a really good outlet for educating the community as a whole. Your Soil and Water Conservation Districts have a good connection with the people on the land, where I think you're going to make the most change. So that's my comment.

**Connie Maxwell, NMWRRI.**

Vision: reduce occurring maintenance issues by restoring the watershed. You said ecologically, I think you said a couple of more things. Is there anything else in that vision?

**Angel Montoya, PFW.**

I said by building a healthy watershed, ecologically and economic.

**Connie Maxwell, NMWRRI.**

Got it.

**Dennis McCarville, EBID.**

This is Dennis. I just wanted to jump in and Connie, maybe you could just mentor in the Master Conservationist Program.

**Connie Maxwell, NMWRRI.**

Dennis, why don't you describe it?

**Dennis McCarville, EBID.**

I think I'm not the one to do that. Basically, their goal is to educate the community. They are providing courses right now at this moment that can start that process. And they're trying to get a lot bigger. And for anybody who doesn't know about it, they can probably use your support.

**Connie Maxwell, NMWRRI.**

Craig, I see you're still with us. You want to add a couple of words to that?

**Craig Fenske, DASWCD.**

Craig Fenske. We worked two years putting together the Master Watershed Conservationist Program. It's a series of eight community forums and we have a large number of partners, some of which are on this call, that are contributing to those educational efforts.

As an example, the next forum will be John Gywnne and David Dubois talking about climate. To find out more information about it or sign up for it you can go to the Doña Ana Soil and Water Conservation District website, and we're going to archive each of those eight forums and have that for future reference.

**We're engaging volunteers to participate in some of these projects that are being described in the upper watershed, the green infrastructure kinds of projects that we're looking to engage volunteers to actually do some of that work. I think the bigger side of that is not just the onsite projects that they will accomplish, but I think the important element is also the educational and people in the community will be able to help advocate for the watershed itself.**

So for more information, you can go to the Doña Ana Soil and Water Conservation District site. Connie has been one of the huge participants in that. And I think help us with the vision and to put that together.

# LRG Workshop Issues / Strategies / Visions, cont.

**Connie Maxwell, NMWRRI.**

Xochitl, are you still with us? I know we had we had talked about you giving us some examples of some of your priority areas.

**Xochitl Aranda, IBWC.**

Okay. I'll just share the problem areas that were identified and their reaches.

But we can attribute that to the confluence. So the problem location number one, and this is from upstream to downstream this is the Tierra Blanca Creek to Sibley Arroyo.

**Connie Maxwell, NMWRRI.**

Do you have the ability to copy and paste that into the chat? I'm thinking I'm not going to get the spelling, let me see if I can, cause I'm looking at a map. So let me see if I can. Did you try to share and not have the ability? I realized I hadn't said it to multiple participants. Would you like to share what you're looking at?

**Xochitl Aranda, IBWC.**

Okay. Yes. Let me try.

**Connie Maxwell, NMWRRI.**

Okay. And Will, I just saw your comment that you liked the idea of a crew perhaps funded by a water fund. That's a great idea. Thank you.

**Xochitl Aranda, IBWC.**

Are you able to see my screen? Okay. And I'm sorry, I can't zoom it in any further and I couldn't open the PDF. So this is as good as it's going to get.

So at the top, you'll see the problem location number one, the Tierra Blanca Creek to Sibley arroyo. Downstream from that, we've got the Salem bridge to Placitas Arroyo. We've identified here Thurman one and two arroyos and that's where we have our pilot projects. That was going to take care of that problem area. But then, of course, we still have the Placitas Arroyo that's a big contributor of sediment.

Problem area three is Siphon A restoration site to Rincon Siphon. And basically all of that is due to the incoming sediment from the Rincon Arroyo. We've got Rock Canyon to an area that's below a Rincon Tonuco drain.

And then we've got down here in the Las Cruces area, the Picacho Drain to downstream of Mesilla Dam. I'll scroll down. We've got the east drain at Vinton to Vinton Bridge. And then we moved further into the El Paso/Sunland park area at the Nemexas Drain and the Montoya Drains. Most or all of these we clean out on an annual basis just to maintain the flood capacity.

So the purpose of this study was to identify the problem areas where we see sediment aggradation and deposition. It studied the whole reach of cannalization. And then from there were recommended channel modification alternatives instead of going in and cleaning out the channel, what measures can we put in? A lot of them had to do with improvements within the arroyos themselves. And for us, basically any project we can carry out is constrained to our right of way. In many of these locations, we have a very limited right of way in which any improvement that would provide any significant benefit could be built.

# LRG Workshop Issues / Strategies / Visions, cont.

And so that's why the Thurman one and two were selected. We did have ample space there to build something of a size that could provide a significant benefit. The other area we looked at was doing some form of sediment basin there. But again, that's a very restricted space that we have to work with. As well as the Bignell Arroyo, that's another location that we looked at.

So in looking at the different alternatives and ways to prevent the sediment from entering the river, our greatest partners are going to be the stakeholders and the adjacent property owners and the municipalities.

Because it looks like we're going to need to implement something further upstream that's not within our right of way, we were working with the Village of Hatch for some sort of spreading of the arroyo water before it reaches the river.

Things like that, we definitely have a lot of interest in trying to find solutions upstream of the actual use, within the watershed, so that we're not having to spend so much time. Our operations is basically cleaning out the sediment every year when it's not irrigation season.

Non irrigation season, we're removing sediment from the river channel and the arroyo confluences, and then irrigation season comes that sediment that we removed that's being stockpiled, we'll be transporting to deposit sites.

So really our main focus in this area, for IBWC, is sediment removal and, of course, maintaining our flood control structures. We are currently carrying out another study using LiDAR, using sediment transport modeling in order to determine a more detailed study than what was done here.

So we're looking forward to the results of that, and identifying more concrete alternatives, more specific approaches that we can take, because we have removed sediment in the last couple of years and significant amounts of sediment, it does reflect that change.

It does reflect the channel geometry after the sediments been removed. So we're looking forward to that and, of course, being able to share that with our stakeholders and our partners in order to be able to come up with these solutions.

## Zachary Libbin, EBID.

Xochitl, this is Zach. I think your comments are great and we definitely like to work with you on all those efforts. And certainly those are some of our big picture items that you're talking about there. I think it's important that we all think outside the box, too, in terms of right of way. For example, the Rincon Watershed is really nobody's property besides the BLM and the ranchers that are grazing out there, but we all are impacted by it.

And so we have to think outside the box in terms of right of way. That there's not just a bid to just stay within our right of way. We don't have very much besides canals and laterals and drains and our 25 flood control dams, but thinking outside that box we can all work together on some of these efforts, like bringing in funding for some of these projects.

We may not move our equipment up onto the watershed, but we can support the efforts beyond just focusing within our right of way

# LRG Workshop Issues / Strategies / Visions, cont.

Connie Maxwell, **NMWRRI**.

And Xochitl, is that study just looking at the channel within your right away, or is that also looking at potential upstream threats to the Rio Grande valley?

Xochitl Aranda, **IBWC**.

I'm not too sure, Connie. I'm not managing that project, but I believe it's focused on just the river. And then of course looking at the watershed and runoff and the sediment that enters the river from all these different arroyos. As far as flow and sediment transport, I do believe it's just focused on the river.

Connie Maxwell, **NMWRRI**.

It certainly will be interesting to see that particular study. It probably will validate the hotspots that you have identified. But it'll be interesting to see some of the estimates that come out of that.

And Zach, thank you for your point about thinking about things on the watershed dynamic scale and needing to think out of the box and our right away. I think that would warrant a particular vision. I know, folks have said, Jessica build a network and working group and achieve bigger things.

People have talked about coordinated efforts but I think something along the lines of, a coordinated approach where we're working better together. I don't know. Zach, could you maybe put that into a vision where we're more in step with each other or going beyond thinking outside the box? Put it into a vision.

Zachary Libbin, **EBID**.

If John's still with us, I'm going to kick that to him.

Connie Maxwell, **NMWRRI**.

What do you think, John?

John Gwynne, **DACFC/SC**.

Sorry. John was multitasking. Say again?

Connie Maxwell, **NMWRRI**.

Zach mentioned the point that it's important we all think outside the box, that we're coordinated. The IBWC has its challenges legally, being constricted to their right of way. But as you just heard, Xochitl was talking about how they're definitely concerned about upstream and the need for their greatest partners to be stakeholders and municipalities.

Maybe putting a vision to that, that in this watershed, one of our visions is that our coordinated efforts do think outside the box, do go beyond our own right of ways. I'm struggling for a good way to put that into a vision.

John Gwynne, **DACFC/SC**.

So the way I look at this is, and maybe this will help, is that **each of us have our constraints by our organizational rules and regulations, policies whatever they are.**

I think we all see the problems and we know what the problems are, or at least have a general understanding. I think it behooves each of us to see what we can do within our own framework that will help us achieve

# LRG Workshop Issues / Strategies / Visions, cont.

these goals together. And as an example, we were having issues with getting sediment out from behind dams. These particular dams were on the BLM property. Well, BLM has a tool in their toolbox that basically is a free use permit that allows us to get rid of that material. But if we don't know what to ask for when we talk to them, then we don't know that tool even exists. So one of the things each of us can do is to help the others by saying, "here's something that we can do that's within our realm and let's see if we can find ways to make the tools that we already have work."

And I think that's the important part here, is that we do have constraints. **Everyone, we're constrained by state law and federal law, as well as local policies. And I think the key is to be able to work together, to find ways to get things done within the frameworks that we have already put in place, not necessarily to breaking any of the rules or to take someone outside of their levels of expertise, but to find ways within our own processes that we can get things done.**

## Connie Maxwell, NMWRRI.

Yeah, that helps. One thing I'd like to end on, and I don't mean to open up a whole other topic, but it occurred to me that as you were talking, John, that's one thing that we haven't really talked a lot about. But as a final note, are there barriers that are in place now that make the objectives and the visions that we've talked about more difficult?

And the one that I can think of in particular, certainly in terms of water availability and water quantity, one of the issues of the valley itself is that water use with farming

really incentivizes trying to pick the crops with the highest consumptive use because that establishes your water rights.

So there's a barrier to water conservation practices by farmers in particular. And perhaps there are ways that we can do pilot projects that maybe don't change priority appropriation, but we can come up with agreements that can mitigate some of those. Or do an ecosystem service payment kind of program that incentivizes a different approach.

Any kind of final visions on turning around any particular barriers that might be a strong dynamic for our region?

## John Gwynne, DACFC/SC.

I think we've talked about this in the past. In that, obviously this entity- as Stephen puts so eloquently- is that lobbying for us is probably a really big thing in trying to get some of the rules modified to help us. Some of them could have to do with water rights. As an example, you're supposed to empty a dam within 96 hours- flood control dam.

And so maybe that could be a way that helps, and it requires developing the tools to make that happen. I think those are some of the hurdles; that we have to look at procurement regulations in all of this we're planning to do all these things.

**When we look at the procurement regulations themselves, things get really tricky for public entities in terms of procurement. Can you spend public dollars on private property as an example? Not really.** The state pretty much precludes that it's in the constitution. And there needs to be some ways to figure out how to make some of these things work.

# LRG Workshop Issues / Strategies / Visions, cont.

And so there's a lot of pieces and parts that I think that can be moved forward in terms of policy. But I think they're also very far out there. They don't happen overnight. We've also talked about, and there's some movement about developing, the maintenance fund within the state for flood control facilities. **There are so many of these orphan structures out there that are really not ever meant to protect people. But because of hazard creep, there's many entities that don't have the dollars to go out and operate and maintain these facilities properly.**

**And that puts the public at risk.** There's some movement to try to develop a statewide fund to help. So, does that answer your question, Connie?

**Connie Maxwell, NMWRRI.**

Yeah. That definitely helps in terms of some of the barriers. I think that gives us a nice kind of vision. That question. And I'll ask one last question as we go.

So we're working towards a bigger workshop that would include producers and so forth in the winter—January, February, maybe March. It seems like a good way to structure that workshop, would be for us, as different people working together, to come up with presentations on things that we're doing, certainly ask again if we've got the visions and the issues and the strategies right, but then also present some preliminary plans ideas and get feedback on those and use that as a place to build actual projects.

What do people think about that? Or if they have any other ideas of other barriers that we need to address?

**Zachary Libbin, EBID.**

Connie, this is Zach. I don't think this answers your last question. Building off a little bit of what John was saying and leading them to your question, a good example is the NRCS watershed project coming down the pike. Using that as an example, previous NRCS watershed projects, like the Green, Jaralosa, the dams that IBWC does. Most of that maintenance was cooperative between IBWC, EPA, DA, Caballo's Soil and Water Conservation District with the NRCS. So it was combined and nobody said, this is off of our right away. We can't help with this. It was documented that those were necessary efforts up on the watershed.

And so **further discussion on the value of these projects to the entire system, to the different entities.** I think that's a discussion and working together on those visions that gets us to being able to work together beyond our right of away.

**Connie Maxwell, NMWRRI.**

That's a great example, **that there are mechanisms that do allow different agencies to work together and leverage each other's right of way, so to speak. And then maybe, this is going back to that original question of thinking outside the box and collaborating together, we utilize existing mechanisms that allow us to collaborate. And maybe expand mechanisms like that.**

That's a great example. And I'll hit you up for some more details on that example. We've got a lot of things going on. I think that's part of the challenge with us as a group is that we've got a lot of little things going on and now we're trying to build it into a cohesive movement.

# LRG Workshop Issues / Strategies / Visions, cont.

So if people have any ideas about how we should structure that workshop in the winter, please send them along. But also, let's think about how that should be structured, the different things that we want to start to put together as presentations. Who would want to present? Which projects? Different models and hit the different topics that we addressed today.

We'll put together today's discussion into a bit of a synthesis document and send it out to you guys. You guys take a look at it and add to it as you see fit. But any final thoughts before we head off to lunch for a much needed break.

All right. Thank you everybody so much for spending the time today and exploring these ideas and moving this forward. Have a great rest of your day.

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# LRG Panel

*This panel was in collaboration with the Master Watershed Conservation Program, and began its first program organized by New Mexico Water Resources Research Institute. The program is led by Doña Ana Soil and Water Conservation District with partners NM Water Resources Research Institute; Caballo Soil and Water Conservation District; City of Las Cruces; Dona Ana County Flood Commission; Elephant Butte Irrigation District; Natural Resource Conservation Service; New Mexico State University Extension; Paso del Norte Watershed Council; and Spring Rains Consulting*

## Connie Maxwell, NMWRRI.

Welcome everybody, thank you very much for coming to our first Master Watershed Conservation Program event. This is a panel, The Future of Our Watershed in the Hatch and Mesilla Valleys. The agenda is in front of you. My name is Connie Maxwell, I work at the New Mexico Water Resources Water Research Institute, I'm a postdoctoral researcher and the lead of the Institute's Water and Community Collaboration Lab.

We are going to turn it over to two folks that really started this program. Craig Fenske, he's the supervisor and board chair of the Dona Ana Soil and Water Conservation District and Jerry Schickedanz, dean emeritus at NMSU. I will after that give a introduction Watershed and Watershed Planning and then we'll turn it over to our panelists. They will each make some introductory remarks about their perspective in this particular watershed. We have Gary Esslinger, the Treasurer Manager Elephant Butte Irrigation District; Jeff Witte, the Director Secretary of Agriculture for the New Mexico Department of Ag; Kevin Bixby, supervisor for the Dona Ana and Water Conservation District and the Director of the SW Environmental Center; John Gwynne, the Director of the Dona Ana County Flood Commission, and the chair of the Stormwater Coalition; Gill Sorg, City Councillor for the City of Las Cruces; Don McClure, the Assistant District Manager for

the Bureau of Land Management Las cruces District; and Steve Wilmeth, a local rancher with extensive rangeland conservation experience.

I am excited to be participating with all of these panelists today. After they give introductory comments we will turn to a panel discussion, answering questions from the audience and from each other.

## Jerry Schickedanz, NMSU.

I'm a retired NMSU administrator from the College of Ag and Home Ec.. Tonight is our culmination of a **concern I've had over a general lack of understanding and knowledge of agriculture and food production along with the importance of water**. In Dona Ana County we have a population of over two-hundred thousand citizens and there are approximately only 1,200 agriculture producers who are qualified by USDA for tax purposes. Therefore, it is no wonder why there's a lack of knowledge on food production and the importance of water with less than six tenths of a percent of the county involved in production agriculture. This example plays out all over the US same as here.

With the West in a major drought for the last several years and no improvement in forecast for the near future, the importance

# LRG Panel, cont.

of water has come to the forefront. I envisioned some type of program that was patterned after the successful extension Master Gardener program where local citizens concerned about water could get unbiased information and what they could do to continue the education and informational process after they've been trained.

I brought this concern and vision to the attention of the Dona Ana Soil and Water Conservation District board when I was a supervisor. the board got the ball rolling and applied for a small grant to develop the curriculum. We began organizing and looking for partners who would help with the educational process.

The Covid lockdown came along and I was no longer a member of the board. But Craig and Jennifer kept the ball in the air and conducted meetings through Zoom. Many meetings later we've come to the time to reveal what many have been working toward. I hope you'll find the program educational and useful. Thank you.

## Craig Fenske, DASWCD.

This briefly is our goals. Education is the first one, and we have eight forums that I will describe briefly. We also want to engage a service component of this and we're asking citizens that participate in the educational component payback, a little like the Master Gardener Program in the form of advocating for the watershed. That might be in a planning and engaging yourself in a planning process or engaging yourself in educating your peers or people in some form in our community. Then the second portion of that can be a hands on kind of project. We do have a grant to

do projects on several different locations around the Soil and Water Conservation District: Tortugas Dam, some of the flood control dams, and the New Mexico Water Resources Research Institute will be taking the lead in that. But we'll be rolling out some of the opportunities for engagement in our community on the watershed as we proceed through the forums.

These are the forums, I want to say a big thanks to Connie for taking the lead, she's been a tireless participant in the planning and has been a visionary and I really want to say thanks Connie for taking the lead and stepping up to do the first forum.

We have over the course of the next nine months we have eight forums. Next month John Gwynne is taking the lead with the Dona Ana County Flood Commission and Doctor Chung, David Dubois will be one of the co-speakers on forum 2. Forum 3 we have several lead people, Kurt Anderson, Kevin Bixby, Doug Cramp with NMSU Extension and Mickey Dixon will be presenters kind of giving us the hydrology and (see?) processes for the Rio Grande.

The soils component will be in January and the Natural Resource Conservation Service District will be sharing their expertise in soils and geology.

The City of Las Cruces and Elephant Butte Irrigation District will be sharing watershed management and water quality. The city will be giving their perspective on water and water use, water treatment, and Zack Libbin with EBID will be presenting the EBID infrastructure and the agricultural uses of water.

Water laws and regulations is the next

# LRG Panel, cont.

month. Regulations is a real maze and water attorney John Smith, who is also one of the supervisors of the Dona Ana Soil and Water Conservation District, will be taking the lead on that one.

Session 7 is Water Supply Management. Leslie Kryder owns the Spring Rains Consulting and will be the lead for that discussion.

Jerry and I will be taking the last session working together in the volunteer projects and that will be our concluding forum.

These are our partners (slide) and they've been planning these different forums and have been supporting us in different fashions so we really want to thank our partners, especially the people that have been engaged in the planning through the last two years. For more information, here's the link for the Dona Ana Soil and Water Conservation to register: <https://daswcd.org/master-watershed-conservation-program/>. If you register it will put you on the email list for notifications for the future forums and opportunities to engage in the program. With that, I turn it over to Connie, thank you very much, Connie.

## Connie Maxwell, NMWRRI.

This forum is convened in partnership with the Hatch and Mesilla Valley watershed plan to inform the plan with the Visions, ideas, data, and issues that are discussed at this evening event. The planning project is a South Central New Mexico Stormwater Management Coalition, which we often call just the Stormwater Coalition. It's a Stormwater coalition project with the planning efforts led by our Water Institute. I put this presentation together

in collaboration with our director Dr. Sam Fernald.

You can see that the Hatch and Mesilla Valley watershed, which is technically called the El Paso Las Cruces Watershed does somewhat coincide with Dona Ana County and it spills over into Sierra County. It extends from the Caballo Reservoir to the border with Texas and Mexico.

We all want a sense of what watersheds are but the technical definition is that a watershed is an area of land that channels all of the rainfall and snow melt to a common outlet. So, you can see in this diagram on the left the dark red dashed line. The ridges of a watershed really separate the watershed. So as the rain hits that land it all funnels down to a particular outlet. John Wesley Powell, who proposed in 1879 that the boundaries of our states be divided by watersheds, describes watersheds as "that area of land abounded hydrologic system within which all living things are inextricably linked by their common watercourse and where as humans settled, simple logic demanded that they become part of a community." And really that is what a watershed is. A watershed is filled with lots of ecological and human dynamics.

The Rio Grande, or Rio Bravo as it's called in Mexico, watershed is the largest watershed boundary of our region. Those large watersheds are often called the basin. It begins in Colorado and flows to the Gulf of Mexico. The 1900 miles of flows of the Rio Grande link us to 335,000 square miles of land area, three states, and two countries.

The dynamics of our watershed, you can see here in the state of New Mexico in perspective, in the valleys depend mostly

# LRG Panel, cont.

on upstream surface flow from the north. But our upland conditions of course depend more on our local climate conditions. Watershed issues can include anything that affects the health of the natural resources and the ecology, as well as the community and the land managers which rely upon that ecology. The preliminary identified issues in the Hatch and Mesilla Valley Watershed Plan are that increasing erosion and flooding from degraded upper watersheds is the critical underlying factor.

Of course, water scarcity and aquifer depletion are huge dynamics in our Watershed. We have urban development that comes very close to flows. You can see here on the upper right, we have a need to increase coordination to achieve goals and reduce conflict and there's a need for coordinated Watershed planning efforts in the National Monument.

So our planning process begins right here in the upper-left. What are the visions and the goals built from what the community in this region values? What creates our sense of place? We then of course build a collaborative Network of Partnerships across the landscape. We then identify what do we need to know. And the bedrock of that is characterizing the critical dynamics of the ecosystems and the communities that rely upon them. Out of that we can then identify triggers for action. What are our priority projects? When do conditions fall below a threshold in which we need to do something? And finally, when we implement those experiments or those actions we need to rigorously assess their ability to achieve the visions of the community.

So let's start with the dynamics from the uplands. Increasing temperature and

drought are increasing water scarcity across the landscape. It all starts with the vegetation. Decreases in upland soil moisture result in diminished vegetation cover. Then with that bare ground, the storms, which are becoming increasingly intense around the world, then increase erosion and wash the soils downstream. That soil, washed from the uplands, deposits in arroyos, clogging up those arroyos. Imagine it's much like a confined pipe, it clogs up the Rio Grande, backfilling it and it clogs up the agricultural system in the ditches. This reduces flow capacity for the farmers but flow capacity for flooding as well. And it increases that flood energy, which then erodes the berms [of the fields?]

Looking at the valley dynamic next you can see here right downstream from the Caballo Reservoir, this was a particularly green year, this was 2006, Google Earth from 2006. We know that a natural function of rivers is that flood pulses overbank flow onto flood plains. But in our age of dams overbank flooding at least in this region no longer occurs and it's really the farmlands that perform that function. When farmers spread the surface flow, the water from the reservoirs, across the floodplain fields, it recharges the groundwater and it maintains this floodplain as an extension of the riparian area.

So what we need to do is understand the natural dynamics so that we can understand how our management can mimic and restore those natural dynamics. When we use management to spread and slow flow that's when we can start to support that vegetation cover. Vegetation is, as I mentioned, central to everything. The more vegetation we have on the land, the more infiltrations that we're going to

# LRG Panel, cont.

get. Vegetation acts like a little barrier to that storm flow and the roots as paths into the soil itself. We have more vegetation, we get more infiltration and recharge of groundwater aquifers.

This particular process is a feedback loop, the more infiltration we get, the more soil moisture we get, which then in turn supports more vegetation. This feedback process can disrupt some of the processes that are causing the issues that we experience in this area. When we infiltrate we reduce the flood volume and the flood energy that we get from high intensity storms. We might not be able to get all of it, those storms are producing an enormous amount of water, but we can get some off the top and importantly that can then support more vegetation. Over time it becomes a more powerful process. With that flood energy reduced, we have reduced erosion and reduced soil transport.

What does this spreading management look like? Ultimately, we're applying an approach that has similar dynamics as beavers. Beavers in perennial, in streams that flow all the time, have been shown to increase stream flows because they're slowing the water down, they're spreading it out, they're filling the soil moisture in the bottom of the channel and the sides of the floodplain, and on into the floodplain. And that whole system is holding water and releasing it more slowly.

Our management can mimic those functions. Here you can see a project that we did near where I live where we put logs from thinning projects strategically into arroyos and bumped the water onto the floodplain and you can see the grass response to that management. Then we go

into the little rivulets up in the Watershed. Here it looks like this is tall, but this is really only one rock tall, so we're not creating waterfalls here. This is really a shallow, porous terrace where in the arroyos we can create these terraces, collapse that water, and slow it down. As we get onto the larger fields in our rangelands we can put stone lines or net wire fencing, debris dams or brush weirs along the contours and create very shallow pooling to infiltrate the water down.

As we get closer to the fields we can create passive ponds, not larger dams. We're having issues with larger dams filling up with sediment and then when you clean them out you start a head cut process which creates more erosion. These passive ponds bring water in and over bank and they can become sediment traps outside of that process.

And then, as I mentioned, in the valleys below flood irrigation from surface water can happen on fields, can happen in ditches, can happen on pastures. We need to know how much of this restoration can actually achieve our goals. And to do that we have to do studies on several scales. Here you see the scale of the restoration practice, the small-scale, the fine scale, the microscale.

This is a pilot project in the Rincon Arroyo Watershed, which is you can see, on the other side of the Caballo Mountains from the Caballo Reservoir. The outlet to this watershed is just downstream from Hatch, it's the village of Rincon. It's a large watershed, 134 square miles. It's the watershed in this region that contributes the highest estimated sediment into the Rio Grande. An estimated 36.2 acre-feet per year in a study done by the IBWC [Tetrattech

# LRG Panel, cont.

for them?] This particular study, which is funded by the New Mexico Watershed Implementation Grant, it's the Clean Water Act section 319 funds, implements restoration into sub-basins. A sub-basin is just a name for a small watershed.

Where we're installing these restoration practices upstream from our issues. We're pairing them with control subbasins and we're rigorously monitoring this practice to see what is the effect of the restoration practices on the runoff, on the soil moisture, on the E.coli transport, and several other factors.

Then we have to say, once we understand the dynamics of individual practices, we need to go the next scale, the watershed scale. Here's a study that I completed on that same watershed to identify what are the best locations for our management. Watersheds have complex ecosystems, ecosystem indicators, so I synthesized topographic indicators, things like where are the widest floodplains, where are the best soils, and where in the watershed does it rain more frequently, which is usually around mountains of course. And then we estimate the actual facts of putting these restoration practices in. Right here you can see what's called a hydrograph. All it is is the amount of water over time in a storm event and this represents a medium event. This is a little over 1300cfs and you can see if we installed watershed restoration in our priority one ranked locations we can bring that quantity and that energy down to this level and so forth.

So this starts to tell us what are our best locations and how much do we need. But ultimately we need to synthesize things on regional scales to understand if we can achieve our visions. We all know humans

are a main driver of ecological conditions, making it critical for collaboration across land and water managers and the larger community.

The larger community we need to understand their visions and the challenges that they face. In this region resilience in our agricultural communities is [?]. Across the world nearly 40% of the earth's lands are managed agriculture and here in New Mexico that's 55%. But collaboration is not as easy as wanting to do it. There are real differences between for example upland range, flood, and irrigation managers in the tools that we use. The vulnerabilities that our stakeholders face, the objectives, the decision, and the time.

So for our Reclamation Drought Resiliency Project, which is led by EBID [?]. The New Mexico Water Resources Research Institute will task [?] the ability of strategies to [?] the stakeholder visions using customized models where we integrate the best science and data. The Institute has additional funding from the Interstate Stream Commission's 50 year water plan and we will be collaboratively developing an independent Water Institute report that documents the visions and recommended strategies from the stakeholders.

We're going to be synthesizing information, [hosting] focus groups with farmers and ranchers, workshops, broader community conversations. At the Institute we have a statewide water budget model, we use inputs from that but we also add data from regional unique dynamics and socioeconomic factors. We can't just look at water, we can't just look at one silo. We have to integrate across the region and we'll be doing that with the drought resiliency project.

# LRG Panel, cont.

So what do these visions look like? I'll just run you through quickly a couple. We've identified a couple of visions to slow and spread the flood flows. To one, mitigate the scouring floods, reduce the soil erosion, and the soil transport downstream into to the Rio Grande, the ditches, and the flood infrastructure. The second vision is to contribute to recharge of groundwater, both in key upland areas and in the valleys downstream.

You can see here at Caballo Reservoir this is the Hatch Valley, here is the flows from the Rincon Arroyo Watershed. The idea is to manage these flows, this isn't just a surface water network. To support the ribbons of green we're spreading these blows onto the fields, onto floodplains in the uplands to support these ribbons of green across the landscape.

So a couple of different strategies. One, agriculture is a system for recharge. Like I said, ranchers in the upland and farmers in the valleys spreading flood flows. Second strategy, combining the aquifer recharge with ways to reduce water demand means looking at alternatives in addition to the popular policy of fallowing, such as extreme water efficient crops.

What we're going to do in this model is test to what extent can alternative strategies achieve these future visions. The benefits of the strategy of agriculture as a system for recharge are recharge soil moisture at aquifers to decrease flood energy. The benefits of the strategy combining aquifer recharge with ways to reduce water demand needs is a reduction in pumping and water use competition.

So I'll conclude with what are some of

the policies that folks are doing other locations? And I'll start with the recognition of watersheds as our fundamental infrastructure for our region. In 2016 California passed a bill that recognized watersheds as fundamental infrastructure because of the storm runoff across the landscape. Eligible maintenance includes upland vegetation management to restore the watershed's productivity and resiliency, meadows, roads, and stream channel preservation.

I'll also turn to water banking. Two current dynamics dominate the need to address water competition in areas with significant agricultural water use. The sale and transfer of water rights out of agriculture and strategies to fallow land and water banking agreements [?]. Yet, these

Policies in many areas often do not comprehensively consider the resilience of the agricultural system over the long term, which can result in unintended consequences, such as soil degradation. You see soil coming off of fallowed fields in many regions and reduced farmer livelihoods.

Water banking is an important strategy EBID has been a leader in with some of the most progressive water banking policies but there's also a critical need for additional choices in water banking beyond fallowing such as support for high water efficient crops, water conservation measures such as cover crops, and flood flows as an alternative source of water in these programs. This is something that we are looking at with the ISC.

Floodplain reconnection has been around for a long time but is starting to become large programs in certain areas. California in

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the thirties created the Sacramento Valley bypass where floodwaters go onto flood fields in that area. The Dutch River Room for the River program, begun in 2007, consists of over 30 projects to strategically restore the river's natural floodplains.

I'll end with managed aquifer recharge for the valleys. Our own Albuquerque and Bear Canyon has infiltration basins in an arroyo itself. The Central Arizona Project obviously does this more infrastructure approach of spreading pools. But this one particular project in California I think is really pretty terrific. You can see the fields here some converted fields to riparian wildlands where it recharges excess water supplies for future recovery.

Thank you very much for your attention, I'll end with asking you to join our Hatch and Mesilla Valley Plan workshop which will be Wednesday, October 20 from 9 a.m. to noon. We'll send out information about that. Finally, just acknowledging our funding, we have two Bureau of Reclamation projects, the Cooperative Watershed Management Program for the plan and the Drought Resiliency Project as well as the State of New Mexico funding our Institute with our Community Hydrology Program, the NMED project I mentioned and the NRCS has started a Watershed Restoration Project in the Rincon Arroyo.

Thank you very much, I'm going to now turn to our panelists and ask that we start with your five minute introductions and then we'll get started with the panel discussion. We will start with, go all the way to the beginning, we'll go in this particular agenda order. We'll start with Gary.

## Gary Esslinger, EBID.

Thank you, Connie. I appreciate this opportunity to come before this group and certainly want to thank those who organized it. When I was asked to present I thought about what I do in my job as manager of the irrigation district is to supply surface water to the farmers here in this valley, over 90,640 acres. This case study that I am presenting is something that I presented back in 2016 under the Obama administration to the White House Water Summit. We were asked to participate and the case study that I presented was Adapting to Drought in Climate Change, Stormwater Capture in the Elephant Butte Irrigation District. That's my passion.

Certainly what you see before you is what I refer to and we refer to at EBID as the sleeping Giants. These summer monsoon events, you've seen them all through August of this year, they happen just about every year somewhere between July and September. These Sleeping Giants lie in our watersheds from the Hatch Valley all the way down to El Paso. And you never know when one of these is going to wake up. Certainly it is our concern dealing with the profound droughts that are occurring now, the intensity of the droughts that started back in 2003 and we're still living in them. It has raised the awareness at EBID to begin to manage how we can foresee these events before they are destructive. And if we can get a handle on how we can at least begin to evacuate our irrigation water to receive stormwater then it's to the benefit of the whole entire valley if we can manage water and slow this water down as Connie has referred to.

So, those Sleeping Giants right there that you see are a result of what you see in

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the bottom of the flooding of arroyos. This is the Rincon Arroyo going directly into the river. What do you do with this water once it's in the river? Well, my goal and part of my management scheme under our Stormwater Management Program is to capture this water, to reuse it, to either irrigate with it, or recharge the aquifer.

These are clearly issues that we see all summer long specially in the drought season. So trying to manage water when it's already in the valley floor is difficult. **What we try to do within EBID is try to capture this water, put it in our system, and then spread it out across the valley floor.** That way we're doing exactly what Connie is suggesting is that we take this water and spread it across the valley and recharge our aquifer when we can and we can irrigate it when that's possible.

The bottom slide shows where we have a flow of water going directly into one of our drains. This drain is normally dry because of the drought, so here we are capturing and putting this water to use in a drain. If you went out to that site today you would see a forest of cottonwoods that have come up because we have been able to utilize our drains as a way to feature habitat restoration. So when you have 300 miles of drains to work with, there's a great potential for spreading this water out and also growing these habitat restoration sites.

Here's an example of, the pink flow is the Placitas Arroyo that broke in 2006 and flooded out Hatch. The blue line is the Rincon Arroyo. They both came on at the same time and put a little over a thousand cubic feet per second in the river on top of what we already had as irrigation flows going to Mexico, to EBID, and to El Paso #1.

So what do you do with these spikes? We have these gauges in the river to tell us where these flows are hitting, the amount of water, and then our reaction to this event was well then we'll put it in the Leasburg Canal which is downstream of where these arroyos were coming into the valley.

**Strategic timing, preparation is a key, understanding where this water is coming in, and then how to manage it is what EBID is, that's our goal is to actually prepare for these events and then deal with them.**

You can see that the time frames to do this is basically what we use as weather stations, Doppler, we can track the storms coming in from Deming or from the south from Mexico or even from the East coming over the Anthony Gap. We can determine through these Doppler Radar where we may have an issue coming 20 miles out. We can then start determining where we would deal with this water when it hits the valley floor, our watershed.

The slide in the bottom is a watershed weather station. We have over 15 of these watershed weather stations already up and down the valley and now we've added another 30. So we have about 40 weather stations with rain gauges where 20 and 30 miles out we can determine what kind of event is going to happen in a certain area and then be able to prepare for the flooding that will occur in the valley floor and see if we can manage it the best we can.

We adopted our portable rain gauge to work with the Bureau of Land Management who of course we're dealing with them right now trying to put in about 16 more of these type of rain gauges. What they are are telemetry units where we get real-time data

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every 15 minutes sent into our office so we know where these rain events are, we know the amount of water in that rain event and then we can determine what we do once it reaches the valley floor.

This event happened at Leasburg, you can see the first chart the water came into the river upstream in Hatch. We captured it at Leasburg diversion, we put it in our canal which is the second slide, and from there we dumped it into a drain. Well we have groundwater monitoring wells along these sites where we can actually see that the recharge is occurring. If you look at the bottom slide MP428, that's a monitoring well. You can see that as we dump the water into the Seldon Drain, it slowly brought the water table up. You can actually see that the recharge is occurring. This is happening up and down the valley as we speak right now.

When you're monitoring rainfall you need to be able to receive it. This is the Leasburg Canal, this is a place where we can accept this stormwater and spread it out through the valley. If the farmer can't use this water because of sediment or the trash that comes with the storm event, then what we do is put it in our drains which parallel these major canals. And then, of course, the drains spread that water out and recharge the aquifers. So the diversion of stormwater is all planned out. We use our radio telemetry to meter and monitor and understand where the water is and then we try to deal with it during the flood event.

This is basically what happens, you get a weather station way up in the Alamo basin, which is above the Robledos. We track that storm, we find out that it comes in above Leasburg Dam. From Leasburg Dam we divert it into a canal and from the canal we

divert it into the drain or a farmer uses it.

So our primary goal in stormwater capture is to either use the water directly for irrigation or infiltrate it into the aquifer recharge of the District. That brings a whole lot of benefits with it. Stormwater capture helps ensure the safety of the people and the property downstream. Secondly stormwater capture sites such as Seldon provide habitat for many birds and wildlife species and finally by slowing the water down in our drains we can potentially stop the harmful microorganisms like e-coli from getting into the system by just slowing it down and allowing the sunlight to kill the microorganisms.

There's multi benefits to this approach and certainly it's something that we want to improve. We think that cooperation with BLM, with the Soil and Water Conservation District, with other folks here in this valley. We need to go to Santa Fe and explain to them that there is a benefit here when we have a monsoon event. It's just that we need to do more of this type of monitoring and metering to capture and reuse stormwater. Thank you for the opportunity to speak .

## Connie Maxwell, NMWRRI.

Thank you Gary, your efforts are very inspiring and I agree, we need support to allow you guys to be able to extend this program. Jeff, you're next.

## Jeff Witte, NMDA.

Thankyou...Iwanttostartbyreallyrecognizing Gary and the team that thought of this series. **As a society we take this stuff for granted. We take watersheds for granted.** I think there are very few people around

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that understand the impacts of watershed. We think about watershed and you look at the mountains, like my background, you've got the Organ Mountains behind, you've got the Sangre de Cristos and some of the other big mountains. You think about watershed tradition. But watershed in the desert is a whole different creature. I think it's something that we need to pay attention to. The presentation that you gave, Connie, was a great overview of the impacts of watershed. What Gary is doing at Elephant Butte Irrigation District is one of the greatest tools that we've got to really help.

I'm going to talk about some of the things that I think about in this five minute introduction and be able to get into some of the stuff during the discussion. As I drive to the office on a daily basis down here in Dona Ana County, I pass fields where farmers are farming and I also pass fields where it's fallowed. I pass fields that have been converted into that final crop, families with houses. And every time we do that, we have a change in the dynamics of the watershed. If you think about all the concrete and pavement that has been put up in the outskirts of Las Cruces, in the desert areas, and then you see with these big monsoon events, the new dynamics of the floods and the higher volume of concentrated water that comes through, there's no doubt in my mind that we've had some impact on the watershed just from our development.

That's not a good thing, that's not a bad thing, it's just a fact, it's a fact of where we're at in this society and how we grow. We have to consider that. The other thing that I think about, my wife and I went on a little hike the other day up into the Organs. The greenness of our valley is something we've never seen before. We haven't seen in a long time. And

some people think there may never be another dry day in New Mexico when they look at the green grass and green weeds, it looks like a green grass that's flowing up there, but it's not, there's a lot of different vegetation. I think that's something we need to be paying attention to because **when I talk to my noxious weed team at the Department of Agriculture, one of their concerns is when we have these kinds of monsoon high moisture years, kind of like what we've had, ...the invasive plants take over and kind of push out the native plants. I think that's an opportunity that we need to be paying attention to because they don't go away.** Weed seeds can sit in the environment for hundreds of years. The ranchers have good grazing techniques over the years and that grazing can really help manage some of that stuff as well. Things that we need to be paying attention to.

I'm glad we're having this kind of discussion, we need this, there's never a bad time to have a discussion about the impacts of watershed, on the watershed, especially with our aquifers in the condition that they're in and our reliance on groundwater. What EBID is doing is a good tool to help us for the future. I look forward to the rest of the presentations and getting in a little bit deeper on the watershed.

**Connie Maxwell, NMWRRI.**

Thank you, Jeff, much appreciated...all right Kevin, take it away

**Kevin Bixby, SWEC.**

Hello everyone, thanks for joining us today, my name is Kevin Bixby, I'm the director of the Southwest Environmental Center and

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also on the board of the Soil and Water Conservation District. I really want to thank Craig Fenske and Jerry Schickedanz for hatching this idea and getting the ball rolling and then all the folks who have helped bring it to fruition, including Connie and Jennifer Klitx (?) and other that I'm not really aware of but I know you're out there, so thank you doing that.

So my focus, as you might expect, being director of an environmental center, is on the Rio Grande and the environment. From my perspective, **the river reflects the health of the watershed. Everything ends up there. The timing and amount of flows, the diversity of plants and animals that the river supports**, it all reflects not just what's happening in the upper watershed but on the river as well.

So the river is really a stakeholder in the watershed and I think we should try and keep that in mind. **My metric for watershed health is the health of native fish in the river. If the river reflects the health of the watershed, fish reflect the health of the river.** They're the canaries in the coal mine and they're not doing very well.

To understand why we need to talk about changes that have happened over the past, since the mid-1800s. Back then, it was perennial for most years, year round. There's a pattern to the flows, the flows were highest in the late spring, early summer following the snow melt up north. The floodplain itself was a gigantic sponge where water did recharge, surface water recharged the groundwater. It was a very lush mosaic of riparian woodlands, we call bosques, wet meadows, wetlands, oxbow lakes. The river itself had multiple channels. The rivers floods were not a bad thing they

actually the key factor that maintained and shaped that mosaic of habitats. All of those supported an abundance of wildlife, including at least 20 species of native fishes.

Well, today because of lots of different changes, changes in the upper watershed, the decrease in vegetation that somebody talked about, the building of the dams and the channelization of the river channel itself, there's been a lot of changes to the river and not good changes from the point of view of ecological health. The river only flows when water is released from the reservoirs for irrigation. So it is dry much of the year, especially in the past 15 years or so. It also flows when we have those big storms as has been pointed out.

**Sediment now is a constant problem that has to be removed continually.** The natural flow patterns with that peak in the late spring and early summer, that's gone, it's now a flat sort of plateau during irrigation season. The mosaic of natural habitats that once filled the floodplain has been mostly, 90 or 95% replaced with farms and houses. The river itself has been channelized so it no longer, it can no longer flood. At least, not with the way that we manage water that's released into the river.

The effect on wildlife has been not good and speaking about the fishes, there's only about eight of the native fish species of those original 20+ that still survive. It's really remarkable that any of them do given how the river dries up every year. It was mentioned that with the age of dams, overbank flooding has disappeared and I would say that's not anything that's a necessary consequence of building dams. **We could manage irrigation releases in a way and we could manage the channel of**

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**the river itself to allow more for overbank flooding. There's been some discussion of doing that but it really hasn't been implemented on very much.**

I want to also say that's there's going to be a lot of talk tonight about controlling floodwater. Wetlands in the floodplain, along the river, those are nature's flood control structures. When the river would flood it's banks, the vegetation, the wetlands along the banks would slow that water down and allow it to seep into the ground and recharge groundwater. So I think **when we're talking about restoring watershed health we should definitely look at the habitats along the river, particularly wetlands.**

**My vision for the watershed is that the river is recognized as a stakeholder in watershed health and that we reimagine how to manage the river so that it not just functions to deliver agricultural water or get rid of flood water or runoff, but that it's restored to ecological health and it functions like it once did, albeit on a much smaller scale, with less water.** I think that's very possible to do if we had the will to do that. I think that there would be great benefits not just to the fish but for also the people of this area who would enjoy a living river year round and all the benefits that that brings.

Thank you for the opportunity to be on this panel and I look forward to the discussion.

**Connie Maxwell, NMWRRI.**

Thank you, Kevin. John Gwynne, you are next.

**John Gwynne, DACFC.**

Good evening everyone, thank you for allowing me this opportunity. One of the things that I really would like to say is that there is quite a diverse panel here that has got lots of different experiences, lots of different ideas and I think it's great to have them all together in one place. I hope everyone will take the opportunity to dig in and ask some good questions.

I'm from the Dona Ana County Flood Commission. We were created in the mid-80s to operate and maintain flood control structures, mostly dams. In Dona Ana County there are over 70 named dams. If you count some of the ones that are smaller and pushed up by a farmer there's well over 130. Within a 5 mile radius of Las Cruces there are about 34 dams. So there's an awful lot of these structures, some of them are owned by private individuals, some are owned and operated by folks like us, the Flood Commission, EBID have some that they operate and maintain as well, soil and water conservation districts do the same, International Boundary Water Commission has some pretty big ones as well. So this is a pretty diverse group that manages them and they all serve pretty much the same function, which is to slow the water down, capture the sediment and release it slowly.

Most of them are above, to the east and west of the river if you want to look at it that way. They're usually above population centers. They weren't originally planned that way. Most of those dams were designed to handle sediment and storm water for farmers' fields. And so as our population has grown, these dams are now above homes and above communities and that creates a big issue in terms of how do we manage those? **They don't meet any of the current**

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**design standards.** Most of them were built in the 50s and 60s and there's a few of them from the 70s, and I think there's even a couple from the 80's. but most of them were in the 50s and 60s and they have a 50 year life span based on sediment loading. So you can imagine that they're already at their service life and so as Connie spoke about before, **when we go to remove the sediment from one of these structures, we create a big hole, because the watershed has adjusted to the sediment level in the pooling area. So when we remove it, we all of a sudden create a hole and then we headcut up and it creates more of a problem.** There's a lot of issues with this many structures and what do we do with them?

That's part of what we're here about and the Food Commission in the past has been mainly worried about operating and maintaining the structures, but one of the things that we recognized is that **watersheds are going to play a key role in trying to make these old structure s last and to also slow the sediment down so there's less sediment to remove. That also creates better recharge for us.** There's a lot of key components of each of these parts from each of the individuals that you have in this group that basically have a different view on how things are done but they all see the benefit of a healthy watershed that will help us both in terms of having adequate water and protect people from the dangers of flooding.

Like the irrigation district, the Flood Commission began in 2013 to install weather stations throughout the country in order to try to track the storms, try to find out where the water's going so that while EBID is moving the water, trying to get it

to places where it can be used and safely discharged, we're trying to get the message out to the people that are in the way of the water so that they can get out of the way. So that they don't get flooded or so that people don't get harmed from it.

We operate a series of them and we're currently monitoring. We started with one station in 2013 and we're up to monitoring over 70 stations now. These are all across the county. We monitor all the local airports and we even look in places like Alamogordo, all the way up to T or C and Deming. We're trying to see the storms as they approach and know kind of the energy they have before they get here.

We play a different kind of role in that we're trying to handle the storm water when it gets here. **One of our biggest challenges is once the water hits these dams where does it go?** 99% of the time it has to go to one of EBID's facilities. And that's a problem for them and it's also a problem for us unless we can get a handle on it and be able to get it to a place where it can be used properly.

So that being said, there's an awful lot of talk about. I'm sure we'll get into some discussions about some very recent flooding and I look forward to how we go through this discussion. Thank you.

## Connie Maxwell, NMWRRI.

Thank you, John. As John mentioned, as you're thinking of questions, please feel free to add them to the chat. Once we're through these introductory comments we'll go right into questions. Gill, you are next.

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## Gill Sorg, LC.

Yes, thank you. Let me put this map on the screen here. This is a portion of the watershed that the city is connected to or part of. Las Cruces is surrounded by the Rio Grande Watershed and it is of course part of the Rio Grande Watershed and so the health of the watershed is important to what we in the city, as well as the farmers and all the other people that live in the watershed.

So I kept thinking, **well what is a healthy watershed? To me, a healthy watershed is one that controls erosion but also prevents flooding and in the process of doing that provides open spaces that are good for growing vegetation, which of course in turn provides habitat for the animals lives we have.**

So the city has a system of multiple ponding and as the arroyos get their floodwater, it is held back by ponding, either in a detention pond where the water is held for a while and then it is released slowly, or it's a retention pond. There's some of those too, where the water isn't let go, in fact it all, it's supposed to, I won't say everyone does, but it's supposed to go into the aquifer, infiltrate there.

We believe in stormwater harvesting which is something Gary mentioned about harvesting the water for their purposes but we also harvest the water for growing more vegetation. **That's one of our key things in the city due to climate change as we get hotter and longer hotter periods, we need to have more vegetation which helps keep us cooler.** It also sequesters carbon too, from the atmosphere and so we're [?] on trees in particular and so this is what we're trying to grow more with our ponding area and our open areas where we can store capture the stormwater.

Also, I don't know how many people here know, most of you do probably, that the city is in the process of working with the IBWC about making a wetland along the Rio Grande that uses our wastewater outflow and makes a small wetland. It's not going to be very big but it's going to be at least a wetland there where we can have a few fish Kevin, a few fish in that little ponding area in the wetland, yes. So every little bit counts, so that's what we're trying to do, it's in the process, it's had some slow times lately but it's still moving along.

I've always been an advocate for having little, small check dams to slow the water down. I'm a disciple of the NRCS which has a motto that says, "keeping water on land longer". And so, same thing Connie was saying, is to keep the water there so it will allow more vegetation to grow and capture the sedimentation.

And these little check dams, I'm sure most of you have known that during the Great Depression the Conservation Corps would build the check dams in our watersheds. Of course, being that it's a long time ago, their use has been lost over time. It might be something we want to think about doing in the future . and of course, [Tom and? ] Connie is doing some of that. That's all I have, I'll be open for questions.

## Connie Maxwell, NMWRR.

Thank you, Gill, much appreciated. Don McClure.

## Don McClure, BLM.

Hello everyone, I'm Don McClure, I'm the assistant district manager for renewable

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resources for the Bureau of Land Management. I'm very happy to be here tonight, be part of the panel and it's great to see so many folks who are here tonight to discuss the watershed issues. I think listening to Connie's program I think we all understand that this is a community led effort. It can't just be one agency or one entity, we've all got to work on this as a community. And BLM of course is part of that community and we're committed to working through watershed issues.

I'm very pleased that the discussion has already started to hear what each of us values about the watersheds, about the landscapes and to me it's **starting to be framed up in terms of not only the environment but the economic aspects, the uses that we value on the landscapes and the social aspects. We've got to take those into account in every decision we make.** I mean that for this whole group. We all make use of the watersheds, we all make decisions on how that's used, not just BLM as the land manager. So we look at this watershed issue as part of our Restore New Mexico Program. It fits under there.

And Restore New Mexico got started in about 2006 and it was an effort to maintain and increase the productivity of our landscapes with a focus on eradicating invasive vegetation to hopefully bring back the native vegetation, mostly our grasslands. In the past several years we've started to take a focus on erosion. So this group, to work with you all is very very timely. Connie showed some pictures in the Rincon Watershed that show very extensive erosion. And if we allow that as a group, as a community, to continue, we're not going to have the soil left to grow any vegetative, much less native vegetation.

This is a priority for us, to stop the sedimentation or erosion, keep it in place, slow down the water, let the vegetation cover increase. I look forward to our discussions further tonight, thank you.

**Connie Maxwell, NMWRRI.**

Thank you, Don. And finally Steve Wilmeth.

## Steve Wilmeth

I'm the only rancher or farmer here today. I'll start by saying that when my great grandfather reached El Paso in 1882, late summer of 1882, the Rio Grande was flooding and they could not drive their cattle and cross their wagons but the railroad had been built to Deming in 1882. The trestle was in place in what was then El Paso so my grandfather made a deal with the railroad and they loaded everything across the river. Was the first time that the kids had ever seen a railroad. That was in 1884, in 1888, when my great grandfather crossed the river, the river was essentially dry in early spring. So, the issues of today were certainly magnified at that time.

I will say that I'm a rancher, I'm a past supervisor of the Dona Ana Soil and Water Conservation District and I will also say that as a rancher, I'm going to point to Kevin Bixby who suggested that I be on this panel, and indicate to those panel participants as well as those who are listening that we can bridge across different disciplines and different beliefs. I think Kevin and I demonstrate that.

I'm also a desert dweller. These slides recently, this was during cow work this week. Reminds me that I'm a turf manager. I'm a converter of sunlight. I am a water manger

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and I'll go so far as to say that **I believe that what falls on our lands should be retained for a period of time. I want it to stay and I work very hard to do that.**

As a rancher many times you will here the response "well, we've got tank water." That's an earthen reservoir, that's vernacular of the west. But I don't like tanks. Our tanks have essentially become settling ponds. In that regard and that use they're important but I don't want water running off. The slide you see on the left is an indicator. What falls on this land I want to keep it.

**I'm a protector of open space. My existence depends on that premise.** And I hope that you understand the impact of that. I don't want development on these open spaces. The rancher community is a safeguard against that. Embrace that.

I'm a recipient of these various natural gifts, and that includes drought. I think that will come somewhat of a surprise to most of you tonight but **I think every time we have drought we emerge as better managers.** Dr. Schickedanz behind me here is aware of the discussion, that we literally have thousands of acres of broom weed that has died as a result of drought. The lifespan of broomweed, *Gutierrezia* genus, is 5-7 years but we think that the drought precipitated this wholesale die off. So good things come from drought.

I'll talk a little bit about livestock and I think it's very pertinent to the livestock and what we're trying to do to create a cow that is more drought tolerant. As such I am a livestock manager, I believe in the complexity of grazing but at this time I'm restricted to one basic ungulate directly and indirectly, relatively scarce wildlife complements.

You see photos of Africa, it's no surprise, every ungulate has a particular niche and everyone adds to the complexity of grazing and ultimately a more sustainable grassland.

Don McClure who is here and who is my good friend, he and I work together on projects that I greatly appreciate, **but I think I'm the only rancher in his district that has developed an algorithm that basically directs our rotation of cattle in a rest-rotation process. Extremely important in health and the long term sustainability of these lands.**

I'm also an advocate, a purveyor of sorts, of trying to manage turf under the conditions of how grass has evolved. I want to speak briefly to that. Plant evolution and those folks who study it will indicate to you that turf evolved under conditions of seasonal rainfall and periodic but continued drought conditions. Fire has been one of the factors of grass evolution. Wind has been a factor. Hoof action in ungulates are absolutely a factor. And rest, and permanent rest.

Our program has built that into the planning whereby we have a minimum of 12 months of rest before we return cattle to pasture and I am attempting to extend that. There are a few people who are involved in this who are original thinkers. Friends, colleagues who now believe that we should be extending that rest period to 14 months. Don knows of my strong beliefs in that. But that takes lots of water and we discuss that situation as this thing unfolds.

**Water is the biggest shortfall of southwestern ranches and it is the determinant factor in being able to rotate.** I have neighbors who have watched

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what we're doing, have attempted to do it, but have found it impossible without the ability to transport water, to store water, and to provide water in whole herd rotation processes that are akin to the movement of buffalo.

I mimic natural tendencies, natural flows, as seasonality...our approach to cattle, and basically we have red cattle, against a backdrop, a sea of black cattle. **Red cattle are more heat tolerant.** We want that characteristic in our herd. **But more important than anything, we want a cow that can calve on her own.** We cannot see every cow that calves in this big country, nor do we want to assist in difficult births. We want a cow that can calve. We want a cow that can breed back. But most importantly, and it factors into this discussion and others is that we want a cow that converts, not to a traditional 8:1, and that infers that 8 pounds of dry matter will convert to one pound of gain in calves. **I want cattle that will convert at 5.7:1 or better.** That is a huge factor in drought tolerance.

A number of years ago the Sitz Brothers in Montana said that most of us in the west will not be breeding cattle to carcass characteristics or what a feedlot wants or what a packer wants necessarily, we want a cow that will wean a calf on our conditions, and we want a very drought tolerant calf and cow. That's what we're attempting to do with our ration of 5.7:1. Thank you.

**Connie Maxwell, NMWRRI.**

Thank you Steve, and thank you to all the panelists...let's start with Madison...

**Madison Staten**

Thanks for the opportunity to be here tonight, I'm loving this discussion around watersheds and I would love whoever feels called to answer to just tell me a little bit about how do we better manage surface and groundwater together to better maintain a healthy watershed?

**Connie Maxwell, NMWRRI.**

Great question, who would like to respond?

**Gary Esslinger, EBID.**

Madison, this is Gary Esslinger with Elephant Butte Irrigation District and certainly within EBID we already have a system in place that is pretty robust. We have over 60 monitoring wells in the ground on telemetry where we can monitor what the effects off the drought are doing in the aquifer and certainly we can determine through those monitoring wells the depth of the water table and certainly where there could be a cone of depletion created by pumping, ag pumping. When we know that, then we use our surface water monitoring system to then direct the flood flows to those area where we could then infiltrate those areas of depletion and bring the water table back to a reasonable condition.

Overall, we aren't cratering the aquifer right now as many think. But certainly the drought has not helped the conditions we are in right now and certainly we need periodic good winter runoff and we haven't had those in the last 5 years so it makes it difficult to recharge the aquifer in it's entirety. But when we do have monsoon events like we've had over the past month we do take those opportunities to move that floodwater around to our drains, who

# LRG Panel, cont.

are connected to the groundwater. It shows as the graph I presented in my presentation, that there is an immediate response to the aquifer when we can do that. That's my best answer for you is that **you have to have a great metering and monitoring program in place so that you can use both of those systems to coordinate together the connectivity that's between the river and the aquifer because they are one water source, it's connected.** Thank you.

## Connie Maxwell, NMWRRI.

Thanks Gary, anybody else want to tackle that, "How do we better manage surface and groundwater together to maintain a healthy watershed?" I will mention a couple of points that, one thing that people are aware of is that surface water and groundwater are generally managed separately in many states. We do have what is called conjunctive use management here in New Mexico to a certain extent. But the coordination of those two regulation systems is something that is always really critical to do. I think one of the things Gary responded to is that it takes the nuts and bolts of figuring out how to actually get the surface water in the ground. And **one of the things that I think the state could support us on is helping us develop a managed aquifer recharge program where when we do recharge water into the ground people that have rights to be able to recover it, that works for everybody as well as the healthy watershed.**

Anybody else want to tackle surface groundwater?

Our next question Craig Anderson – "Would Rio Grande Project water be better stored underground in the Mesilla Bolson than

Elephant Butte Reservoir?"

## Steve Wilmeth

Connie, this is Steve I'd like to take that question. Having farmed in the Arvin Edison Water Storage District in California before I came home to go back into ranching, the Arvin Edison district was formed in the early 60s and by that time there were fewer opportunities for surface water storage. But it was discovered that there were natural barriers under the district. When I left California in, at the turn of the century, I think the overdraft at that point in time was only about 10,000 acre feet. Having deep wells and experience in it, we had a very stable water table. However, the issue become is structure there to retain that as opposed to off slope plumes.

I think Gary probably has a response to that, if that structure is there. It works very well if there are structures to hold that water within that basin. If there's not another geologic structure, then your losses could be substantial. So, it's not just a "yes, it's a better opportunity", you should say it's a parallel opportunity and there are examples where it works very well.

## Connie Maxwell, NMWRRI.

Anybody else...would Rio Grande project water be better stored underground in the Mesilla Bolson than in Elephant Butte Reservoir?

## Gill Sorg, LC.

Yeah, I could mention the fact that getting the water into the bolson and then bringing it back out, there's quite a bit of cost involved in that too. So you've got to weigh

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the benefits as well as the costs to see if that would work out.

## Connie Maxwell, NMWRRI.

Let's go on to Vic Crane's question... his question is "How does stormwater capture affect the water rights downstream for Texas and Mexico?"

## Gary Esslinger, EBID.

Let me give that a shot to try to try to say it in a few words. Wild arroyo water is something that comes in below Caballo is what we consider "wild water" and the Bureau of Reclamation used to allow that wild water to go to anyone that could use it, whether it was in EBID or a delivery to help EP#1, or even Mexico. So, **over time, we began to understand the importance of capturing stormwater. So in the 2008 operating agreement that we made with the Bureau of Reclamation and with EP#1, the irrigation downstream in Texas, we made a determination, and it was approved, that we could capture as much water as we could upstream, without affecting the downstream users water right.**

So, it's a great benefit when we can capture as much water as we can in the upper valley of Mesilla and Hatch because if that water gets past Mesilla Dam in huge amounts of water, it will flood downtown El Paso. That was the case in 2006 and 2008 where there was a high concern that they may have to evacuate downtown El Paso. When we talked about that in our discussions of developing the operating agreement, we brought up the benefit if we could capture the water upstream and use it and it was agreed upon, Vic.

And so, that's how we've been able to, then, from that point, improve our water capturing system with more monitoring and metering and then even widening our drains to put this water into our system and then store it. So we've done a lot since 2008 to improve our stormwater capture which doesn't have an affect on the downstream users.

## Connie Maxwell, NMWRRI.

Thank you Gary...as most people know, north of Elephant Butte reservoir there are compact requirement regulations and it's a very different system and it's really not possible. However, I think the points that Gary made show that this region can be a model for other areas and we can start to help other areas in New Mexico develop regulations...Jerry question... "Steve Wilmeth, what is your current watershed problem?"

## Steve Wilmeth

My initial response would be an issue that repeatedly was brought up in our board of supervisors in that...in Dona Ana County we are creating arroyos across 600 miles of roads, the way roads are maintained. And it's not just our ranch, you can go to the Corralitos, you can go to the Portillos and it's a consistent problem where roads are graded flat and little effort is made to shed that water from these roads. Luna county, which has a much smaller budget to do that work, have maintained roads, at least the basic structure of the roads. Now, **what that does is that it creates arroyos in our roads but it also diverts off slope flows of water and starving those downstream site turf stands. It's a huge issue in my mind** and those who have been on the board have heard me talk about it. We've had a county manager there, we've had

# LRG Panel, cont.

the county engineer there and we have basically been blown off. We need to fix it.

## Connie Maxwell, NMWRRI.

Thank you Steve. Yes, we've seen that in so many areas around the watershed. Question from Patrick DeSimio..."From the discussion it sounds as though we have several promising options for responsibly stewarding and restoring the watershed. Who else needs to be involved to make these options happen?"...Patrick do you want to add anything?

## Patrick DeSimio

Just that this might be looking forward a little bit to the education and outreach activities that seem to be envisioned as part of this Master Watershed Conservationist Program. There are plenty of us gathered here today but there are also a lot of familiar faces from in general agricultural and conservationist work. Who else do we need to start thinking about involving to really start making a difference? Who are the key players who aren't yet involved?

## John Gwynne, DACFC.

Connie this is John, I'll start the ball rolling. I would say that in a lot of what we do, **it takes dollars and it takes support. And so, number one you have to get public support for any of the projects that we do.** We would also need to get money because these projects, you saw Connie's project that we're working on up in the Rincon Arroyo. It requires dollars to do that. **We need to get our legislators involved, we need to get our youth involved in terms of managing this once us older guys are moving out into our own pastures. I think**

**it becomes really important that we pass these ideas that we've been working on to younger folks who will then take the ball. Because these watershed projects are not short lived.** They don't do a whole lot in the first couple of years. They take a lot of work and a lot of time. The same thing with the projects that Gary has been working on with EBID, they've taken a lot of years to come together. I would say the projects that the Flood Commission works on, these take years and years to develop to try to find the best way to do things and then to get funding to make them work. Who do we need to get involved? I would say legislators, the general public as well, as well as our youth.

## Gary Esslinger, EBID.

I'd just like to add to that. You know there's this persona out there that the forests' health is the goal of the watershed. I'm not denying that fact, that we need to improve our forest watersheds in order to control and slow down that snowpack runoff. However, **a lot of people, when I talk to our legislators, don't understand we're in the Chihuahuan Desert, our watershed is completely different and I think there's an educational opportunity to try to do exactly what Connie shared with us today** and bring it to the awareness of our local legislators as well as our congressional delegation that you can't put all the money into forest health. You've got to bring some of that our for areas like ourselves, the Chihuahuan Desert, where ranchers like Steve and others can benefit from some kind of funding that would provide them more opportunities to do more of the good work they're doing. It's the same for the City of Las Cruces or Dona Ana County. We don't seem to have the same representation that

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we need that, I think it was only two years ago that the Forest Health Act was passed by the State of New Mexico legislators that funded huge opportunities for the conservation folks up there in Santa Fe and Albuquerque. To answer the question by Vic, we need to do a little bit more educational outreach down here.

**Connie Maxwell, NMWRRI.**

Thank you Gary.

**Kevin Bixby, SWEC.**

Connie, I would like to chime in here. I would echo John's suggestion that **congress needs to be involved** and Gary's suggestion, but probably for a different reason. The Rio Grande Project, it was one of the first irrigation projects in the west, one of the first Reclamation projects, it is a single purpose project. It includes all the water in the river and it's solely for the purpose of irrigation. So we would never, that was authorized by Congress, that was a congressional decision back in '04. I doubt that congress would make that decision again, today, to create a single purpose, to create basically, to convert a river into an irrigation conveyance channel. Which is basically what they did when they authorized a single purpose project. So, **I would like to see congress reauthorize the Rio Grande project to be a multipurpose project.** So it would still serve agriculture, but it would also authorize the use of river water for the river itself, to keep in the river itself for the purpose of sustaining native fishes but also for water based recreation and fishing and what have you. Politically, I realize it's probably never going to happen, but that would be great to see. And I also echo John's suggestion that we need to

get young people involved because I do think that watershed health is more about check dams and all the technical details, it's about how do we live sustainably in climate change and a mass extinction crisis. I think young people are going to pay, to should share the burden of those two existential problems that face the planet so they really should have a seat at the table.

**Jerry Schickedanz, NMSU.**

Connie, I'd like to add to that, if I might. I think the people that we need to get involved, that maybe aren't here speaking today is what this forum was established for, to **educate the general public on the importance of the watershed and the value of water for our future generations. I think the more we can get the general public involved in seeing what the issues are and how they can be solved, that will go a long ways toward getting Congress or the legislature, the local officials,** moving toward some answers to some of these questions.

**Jeff Witte, NMDA.**

I couldn't agree more. I've been on tours to different parts of the state where maybe some of the soil and water districts or some of the other folks have invited opinion leaders out of Santa Fe and even out of Albuquerque to places like between Corona and Vaughn. What they did is they looked at different aspects of watershed, different impacts of soil and water conservation district projects that have changed the landscape and really improved the watershed. I think there's a great opportunity here in Dona Ana County.

I guarantee you, not very many people would understand how any dams there are

# LRG Panel, cont.

or the impacts or the uses of those dams and why it's important. It became very evident a few weeks ago with the floods at La Union and a few years ago up in Hatch. That's when people pay attention. Other than that, people don't pay attention. So I think there's a great opportunity to showcase some of these in a visual fashion to show the societal benefit to your opinion leaders in Dona Ana County but also from other parts of the state so that they can see the impacts and the good things and the challenges that are in front of us.

## **Connie Maxwell, NMWRRI.**

Thank you, Jeff. Couple more questions, Vic Crane – "with the increased planting of pecans, adversely affecting the ability to fallow, what else needs to be looked at to provide the benefits that we're seeing as fallowing?"

## **Gary Esslinger, EBID.**

I don't know if I have the answer. I can't stop a farmer from doing whatever he wants to do on his own farm but clearly we do have in place our policy for a fallowing program and certainly I think the Interstate Stream and OSE is developing a pilot program for a fallowing program. But clearly, the benefits that I see is within EBID we have 90,640 acres but our boundary is 133,000 acres. Which means that there's an opportunity for that land to be used if we have to negate some of the land that may be in houses now downstream. So, our challenge is to keep the 90,640 acres irrigatable. That's something we work on all the time.

With this drought going on, there is a volunteer fallowing going on with a lot of the diverse croppers just in the fact that

they're just not planting a crop because they can't get enough of their groundwater around to irrigate all of their crops or we can't supply them with the surface water. So there's a voluntary program in place that's been pretty beneficial during these severe drought times. It's really the farmer that's making that decision, EBID is not involved at all. As long as we have that opportunity to spread, to move our water righted land around is one thing. For the farmer to choose and voluntary his own farmland to a volunteer fallowing program, then we also take advantage of that. So far, it's been beneficial to our overall operation at EBID. But it's really the farmer that has to make those choices.

## **Connie Maxwell, NMWRRI.**

Thank you, Gary. I'll point out that Patrick DeSimio had put a link to a new pathway of connecting teachers and getting into the schools in the greater Las Cruces area. Patrick do you want to speak to that, quickly?

## **Patrick DeSimio**

Absolutely, so thanks to some funding from the WK Kellogg Foundation and the Stocker Foundation and relevant to our whole involving the youth as stakeholders, there's a new free to use platform for all schools in greater Las Cruces, (the El Paso Community Foundation provided funding for classroom mini grants to support projects). <https://www.communityshare.us/las-cruces/> that's basically a matching program to connect teachers with partners from the community who can come into the classroom to share specialized knowledge, support project based learning and provide real world examples for academic content.

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So, it's basically a great way to connect with teachers who are already interested in working with members of the community and across all sorts of sciences and even the arts. There would be lots of opportunity to get involved in the district. It's expanding from a pilot in the five community schools last school year into again every school at the greater las cruces area. It's going to become increasingly useful for us.

## Connie Maxwell, NMWRRI.

Thank you very much. I would like to ask, many of the panelists have touched upon their visions for the future. I'd like to give it one more go around and say if each of you could even put kind of a metric to it, what would you like to see by 2030? ...relating to some of the conversation we were just having, what could we start to put together for the legislators to say "this is what you should be funding for this region. This is what we should be taking to congress and this is the actual funding programs that would help producers on the ground." ... Folks have referred a little bit of some of their visions but give it a couple dimensions in roughly the next decade, what would we like to see by 2030?

## Gary Esslinger, EBID.

Connie, **one of my greatest visions and opportunities that I see right now is this water infrastructure package that congress is trying to pass.** There is a whole lot of money there if the right people put their program together or write the grant, or come to an agreement of how that water [money] could be used for this aging infrastructure. John is correct, these sleeping giants of these monsoon events are going to wake up and they're going to

walk over one of these flood control dams that is 50 years, 60 years old and it's going to be like a bleep on the radar and that flood flow is just going to come right into this valley. It's going to do a lot of harm.

I think there should be an awareness of that we put together to send to our congregational delegation the need to improve the aging infrastructure. We're already...it's working, it helps, there's just not enough of it and now with some of these high risk dams that used to be low-risk, it's almost impossible for an agency like ourselves, EBID, to fund the improvement or the reconstruction of that flood control dam. So, I would hope that from this forum that we could get the consensus of everyone that we need to put a package together that could maybe tap into this water infrastructure funding that NRCS has, the Bureau has, probably now some of that money will go to International Boundary and Water Commission. **So there's a bunch of federal agencies that if we could cost share with them or cooperate with them, then certainly I think there's an opportunity to improve our watersheds.**

## Steve Wilmeth

I would support Gary's approach, I would be somewhat more specific, predicated on the suggestion that **past glory is not our future, we have to discover future opportunities,** I would support what are we doing on a rider, like Gary's talking about, or as an adjunct to the original Reclamation project and authorization by congress here to number one, protect that 92 plus or minus thousand acres of irrigated lands. this is a very interesting and unique little agricultural universe here for market windows and other things. But I would

# LRG Panel, cont.

also support a complementary approach whereby new water sourcing would be directed to some of these other issues like community activities, like improved habitat for wildlife, I would support that and I would support it on the basis that we would seek water supplies and/or storage that would be able to provide both avenues.

## Gill Sorg, LC.

**I'm looking at the question what does a healthy or restored watershed look like? To me it looks a little greener than it is now. That all comes back to my idea of having water be used by the plants or be added to the aquifer, one or the other.** Any water that's standing around and evaporates away isn't doing anybody any good here, it might do somebody good downwind with additional rain but for us it doesn't. so whatever we can do to recharge the aquifer as well as grow more plants, is something that I would like to see as a restored watershed. And of course our agriculture, there's a lot of plants there, a lot of trees.

## Jeff Witte, NMDA.

I agree with what Gary and the others have said as well. We have an opportunity to really look at these dams and some of the things that are controlling the floods or potentially going to control the floods that aren't controlling the floods. With this infrastructure money that's coming now, and I'm just going to talk about this one part, there's many other things, if we don't get the basics straightened out soon, what Gary alluded to with these monsoon storms in the future are just going to keep growing. The floods will come and in what shape or form they're going to be in, we don't know,

but we have a good suspicion from what we've seen at the storm events we've had just this year at La Union and in the past at Hatch and other places.

If we don't take that opportunity to fix those 100+ dams in this area, we're going to lose that and then it's going to be reengineering the entire part. Some of that we may need to reengineer. We did a project a few years ago, the legislature funded some inundation mapping and whatnot that we did at the Department of Ag for the dam bureau out of Santa Fe. I think we've got to do more of that and we need to do it quickly.

## John Gwynne, DACFC.

I agree, there's an awful lot that can be done and needs to be done both in terms of reducing the amount of floodwaters that we have by having healthy watersheds, that's a big effort, it takes a lot of time, it takes a lot of individual work, but we also have to think about these large storms that come in like the one that hit La Union a couple weeks ago. **That was a 100 year event and those dams were basically sized for a 50 year event. So, this is the issues that we come into is that we have all this aging infrastructure that literally cannot handle the events that we have to deal with.**

The Flood Commission over years has put together a list of projects to help reduce some of the flooding in some of these communities. That list of projects is over \$160 million, that doesn't include any of the dams. That is literally everything but the dams. If you start including all these dams then you're talking hundreds of millions more and so there's no way that any entity here can afford that and so we have to find ways to reduce the stormwater, maybe

# LRG Panel, cont.

even get rid of some dams, maybe find other ways to deal with the water. You know, let's get it directly into the systems that can spread the water and take it to places where it's needed and recharge aquifers. But there's lots of opportunity here and with the individuals that we work with I think we have good opportunities to do that.

## Kevin Bixby, **SWEC.**

I think John's right, **we have an opportunity, climate change, the prospect of more intense storms plus aging infrastructure, it's an opportunity to rethink everything; how we deal with floods, and it's an opportunity to restore the river.**

**I would like to see probably congressionally convened stakeholder process, or possibly under the direction of the Secretary of the Interior, to bring together everybody to think creatively about how do we do this, how do we fix all of these different problems in a way that provides some resiliency against climate change, protects people from flooding, meets the needs of irrigators, and restores the river and the environment generally.** No one here has the ability to bring everyone to the table and sit down and figure these things out so I would like to see an outside agency bring us all together to figure that out.

## Connie Maxwell, **NMWRRI.**

Thank you so much Kevin, thank you everybody, this has been a very inspiring discussion. We will be getting in touch with everybody to let you know about the next Master Watershed Conservationist. Also another plug, we are going to be having a Hatch and Mesilla Valley Watershed

Planning Workshop next month October 20th, a Wednesday, from 9 – 12. We'll let you all know about that.

Thanks again and thanks to Dr. Craig and Jerry for putting this together and Jennifer helping us run through it all. We look forward to keeping the discussion going and convening some major projects to make some real progress for this region.

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