Gary L. Esslinger is the Treasurer-Manager of the Elephant Butte Irrigation District. Gary is a third generation member of a pioneer farming family living in the Mesilla Valley. His grandfather, J.L. Esslinger, Sr., settled in La Mesa in 1913 prior to the completion of the Elephant Butte Dam. Gary's father, J.L. Esslinger Jr., also farmed for over fifty years and is now retired. Gary has also kept his roots in farming as well as other agricultural-based industry. After receiving a bachelor's degree in business administration from Northern Arizona University in 1973, Gary worked six years in Los Angeles for a large west coast flour milling corporation as office manager. After becoming tired of city life, Gary returned to the Mesilla Valley and began working for EBID in 1978 where he has been for the past 27 years. Gary began his District career as Purchasing Agent and has held other organizational positions of Maintenance Chief and Assistant Manager. Gary is, and has been for the past 16 years, the District's Manager and is also the District's Records Manager. Gary was appointed by Governor Richardson as the Chairman of the search committee to select the State Engineer for New Mexico. Gary lives in La Mesa on the family farm with his wife, Tina, and three daughters.

WATER QUALITY CHALLENGES OF THE IRRIGATED AGRICULTURE COMMUNITY ON THE LOWER RIO GRANDE

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My talk today is about the water quality challenges that face irrigated agriculture in the Lower Rio Grande Basin below Elephant Butte and Caballo. I want to also show you some pictures of our area that I happened to find as I am also the Records Manager and Archivist at the Elephant Butte Irrigation District (District). As I went through our archives, I found in an old cardboard box containing some canvas encased negatives—thousands of them—pictures from all over New Mexico. As I went through the file, I found a document that said that the attached photos were those of Herbert Yoe’s family. Herbert Yoe was New Mexico’s State Engineer (1926 to 1930) during the early years of farming after the construction of Elephant Butte Dam. I have some of his pictures here today. Some of these photos are not really clear, but at least you will have a chance to see what the river channel looked like in the late 1800s and early 1900s when these photos were taken (Fig. 1).
If you are interested in seeing these photographs, they are now a part of the historical collection at the New Mexico State University archives. Contact me, and I will prepare the necessary paperwork to get you admitted to the Rio Grande Historical Collection area of the NMSU Library.

Looking at these pictures you see what the Lower Rio Grande valleys looked like before Elephant Butte Dam was built (Fig. 2). Historians have traced farming in these valleys back to the 1500s. During these pre-Project days, diversion dams on the river were built of rock and lumber, and every year the Rio Grande would wipe them out, and every year the early farmers would once again construct the destroyed dams (Fig. 3).

This next picture is on the Las Cruces town ditch, an acequia long before the federal government started the Rio Grande Project in the late 1910s (Fig. 4).

Irrigated agriculture on the Rio Grande has long been challenged by water quality problems. From the pictures that I have shown you, it is clear that sediment was an early problem (Fig. 5). When I think back to our forefathers, I wonder what they envisioned as Elephant Butte Dam was being built. I think they must have had water quality, particularly sediment, in mind as they laid out their fields, the diversion dams, and the canal system. There is a bumper sticker that I used to have on the back of my pickup that said “Silt Happens,” and it is still happening today. Sediment problems are going to be a major problem for future
Figure 3. Man-made diversion dam off the river, 1913 photo

Figure 4. Las Cruces town ditch, late 1910 photo
Gary L. Esslinger

Figure 5. Build-up of sediment below Anthony, 1912 photo

proposed Lower Rio Grande surface water treatment plants (Fig. 6).

The salinity problems that are found throughout the Lower Rio Grande basin in both Texas and New Mexico have been with us for at least one hundred years, and salinity continues to be a challenge today. The Rio Grande Project stores and delivers water to New Mexico, Texas, and Mexico. The Project’s irrigated lands are in the narrow valleys along the river running a distance of over 150 miles. There is a system of drains that parallels the canal delivery system on both sides of the river. The drain system was an afterthought built in the 1920s. Reclamation built the diversion dam and delivery canals, but they did not build the drainage system. Our forefathers’ building of the drainage system is probably the most important part of salinity control, and those drains are still functional to this day. At intervals, these drains discharge into the river carrying irrigation return-flows and naturally occurring groundwaters, some of which are saline. The importance of these saline groundwaters was reported in a 1938 National Resource Committee study that found the total dissolved solids content of the drains in the lower part of the Mesilla Valley was two to four times that of a drain at the head of the valley. Similar elevated salinities were reported in the drains from the El Paso valley.

As a result, the quality of the water in the Rio Grande becomes poorer in the downstream direction. It is interesting to note that water quality is significantly different than it was shortly after the construction of Elephant Butte Dam. In the past, the conventional belief has been that irrigation return-flows were creating water quality problems. Studies done in recent years by New Mexico Tech researchers show that saline water from deep groundwater sources is discharged into the Rio Grande. Table 1 shows the sources of salinity (reported in NM Tech studies) that enter the Rio Grande from the headwater to below the narrows at El Paso. Two-thirds of the increase in the chloride content in the Rio Grande is from deep saline discharges and from discharges by municipal wastewater treatment plants.

The New Mexico Tech study identified locations where upwelling of saline groundwater occurs. They are the narrows upstream of San Acacia; the hills just west of Socorro; within the Elephant Butte Reservoir; the narrow valley in the Rincon valley just before it goes into Seldon Canyon; and also at the narrows just above El Paso.

The District has a fiduciary responsibility to care for water quality and water quantity for our members and constituents and to protect the supply for downstream users. EBID continually monitors the drain system to detect the illegal discharge of pollutants into our system. We also work with other organizations on enhancement of the riparian areas along the river. We are now working with the State Parks Department on the development of a fourth park along the river. We are working with environmental groups in the development of a safe harbor agreement should our riparian efforts attract endangered species not presently found in the area. Within EBID, outside the river levees, there are 90,000 acres of farm lands that are inhabited by wildlife and that provide cover for birds. Our future challenge is to continue to protect and enhance water quality for all users.

<table>
<thead>
<tr>
<th>Source of Total Chloride Burden</th>
<th>Percent Contributed</th>
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<tbody>
<tr>
<td>Natural Tributary Inflow into River</td>
<td>25 %</td>
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<tr>
<td>Discharge From Waste-water Treatment Plants</td>
<td>26%</td>
</tr>
<tr>
<td>Dynamics of Evaporation and Bank Storage at Elephant Butte Reservoir</td>
<td>9%</td>
</tr>
<tr>
<td>Discharge from Deep Saline Groundwater</td>
<td>37%</td>
</tr>
</tbody>
</table>

Table 1. Sources of increase in the total chloride burden in the Rio Grande.
Figure 6. Sediment islands in the river near Rincon, 1913 photo