EPA Tour of southern and central New Mexico agriculture, rangeland, and riparian areas
August 2-5, 2010

On behalf of the Weed Science Society of America, Jill Schroeder, Professor of Weed Science at New Mexico State University, serves as the terrestrial weed science subject matter expert in the Registration Division of the Office of Pesticide Programs (OPP). In this capacity, Dr. Schroeder meets regularly with U. S. Environmental Protection Agency Headquarters staff. In May 2009, Schroeder participated in a fact finding field tour for key headquarters staff from OPP and the Office of Water (OW) of aquatic pest management issues in Florida that was organized and hosted by Drs. Bill Haller, UFL, Kurt Getsinger, US Army Engineer Research and Development Center, and colleagues (U.S. EPA FL Aquatic Pesticide Tour Report, http://wssa.net/WSSA/EPAliaison/documents/EPA%20Florida%20Aquatic%20Pesticide%20Tour%20Report_updated.pdf). This tour provided EPA staff an opportunity to discuss issues related to NPDES permitting early in the process of developing the permit language.

The management issues related to weed and invasive plant management in riparian areas are very different in the western U.S. As an example, water is a valuable and limited resource in NM where annual rainfall ranges from less than 20 cm to 40 cm per year (a limited agricultural area in the high plains of eastern NM receives up to 50 cm) in the agricultural production areas and rangelands. Rangeland dominates southern NM; however, invasive mesquite and creosote have become the primary vegetation limiting habitat to support biological diversity. Riparian areas are threatened by saltcedar invasion which reduces water available for preservation of wildlife and cropland irrigation. Pesticide applications in New Mexico riparian areas will be covered under the federal NPDES permit; however, the extent of waters of the U.S. relative to irrigation districts is unclear. Therefore, to provide information about an ecosystem that contrasts with Florida, Jill Schroeder and Bonnie Rabe, NMDA Division Director Ag and Environmental Services, invited EPA Headquarters staff from OPP and OW to New Mexico on a fact finding tour of riparian, agricultural, and rangeland areas of this land-locked, arid state.

The tour focused on the southern Rio Grande. Because of the arid climate, the river is important for wildlife habitat, water storage, irrigation, and public use. The amount of water available for the southern Rio Grande is dependent on annual runoff from snow accumulation in the Rocky Mountains of southern Colorado and northern New Mexico. Management of the river, the reservoir, riparian areas, irrigated cropland, and the surrounding rangeland is the responsibility of private landowners, and numerous state, and federal organizations and agencies (McDaniel, K.C., K.W. Duncan, and J.P. Taylor. 2000. Saltcedar (*Tamarix* spp.) control in New Mexico. Pages 173-183 in Proc. Rangeland Weed and Brush Management: Next Millennium Symp. and Workshop, San Angelo, TX.; http://weeds.nmsu.edu/).

Tour Objectives:

1. History of the Elephant Butte Irrigation District, hydrology, and management of surface water supplies from the Rio Grande for agriculture in southern New Mexico including a discussion of whether these canals and return flow ditches will be considered waters of the U.S. under the NPDES permit.
2. Specialty crop issues related to water management, pest management, and pesticide use in arid lands agriculture.
3. Discussion of the issues related to invasive species management affecting local, state, and federal agencies responsible for areas adjacent to the Rio Grande and its reservoirs, the different management objectives of these agencies, and how the agencies interact to address

these issues.

4. Discussion of the need for herbicide application in rangeland and riparian areas and the use of precision technologies to reduce off target movement of treatment.
5. Management of invasive species to reduce water losses from reservoirs supplying water to southern NM, Texas and Mexico.
6. Management of invasive saltcedar and restoration of wildlife habitat, including habitat for the endangered southwest willow flycatcher, in the Bosque del Apache wildlife refuge.

Tour Itinerary:

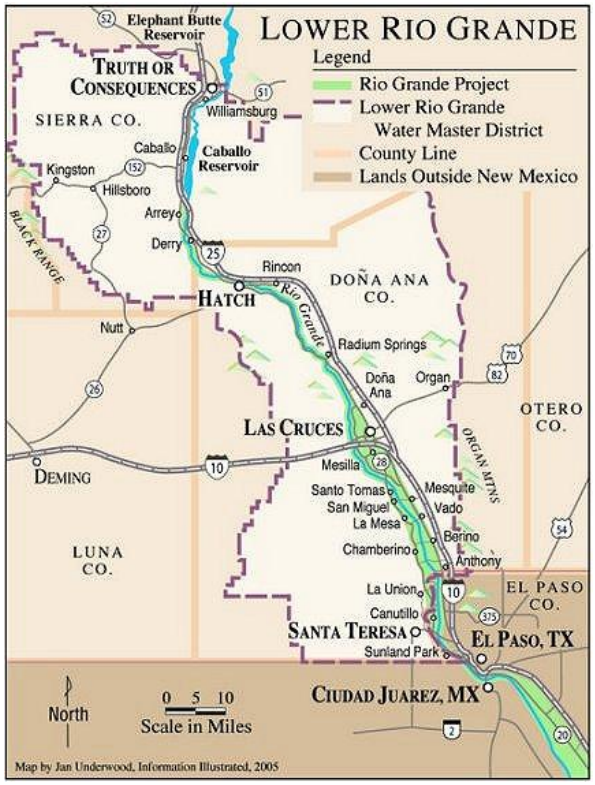
Tuesday, August 3

Elephant Butte Irrigation District (EBID) Headquarters, Las Cruces; www.ebid-nm.org; **Office:** 575-526-6671

GARY ESSLINGER, Treasurer-Manager; gesslinger@ebid-nm.org

Gary Esslinger presented a cultural and legal history of Rio Grande dating back to 1600 and the development of acequias for irrigation of agricultural lands to the authorization of Elephant Butte Irrigation District to manage 90,640 water right acres downstream of Elephant Butte Dam to current concerns for the quality and quantity of water distributed to the water users of the district.

Information about the history of water in southern NM can be found at the following sites:
Treaty of Guadalupe Hidalgo: http://www.pbs.org/kera/usmexicanwar/war/wars_end_guadalupe.html
1851 U.S. Territorial Law: http://www.jrank.org/cultures/pages/3561/Acequias.html
Elephant Butte Irrigation: http://www.ebid-nm.org/general/Docs/NMSU-InterpretingEBID.pdf; http://www.ebid-nm.org/static/PDF/EBIDBOOK-1.pdf; http://www.ebid-nm.org/static/PDF/EBIDBOOK-2.pdf; http://www.ebid-nm.org/static/PDF/EBIDBOOK-3.pdf
1907 New Mexico State Water Code: http://www.ose.state.nm.us/state_engineer_history.html; http://www.ose.state.nm.us/PDF/Legal/Presentations/NM-WaterCodePresentation-byMarthaFrank.pdf
Rio Grande Compact 1983: http://en.wikipedia.org/wiki/Rio_Grande_Compact



EBID Current Concerns were outlined by Gary. While the purpose of the Rio Grande project is to supply water for irrigated agriculture, increasing urbanization and changing demographics of the state along with environmental and regulatory pressures and climate changes (drought conditions) pose challenges to the goal of maximizing the long-term water supply for EBID constituents. Water politics and legal issues pose additional challenges to the district including adjudication and requests for additional allotment by pecan growers, water management and storage, water quality testing (E-Coli in water shed storm waters that enter the system), and environmental issues including those surrounding the SW willow fly catcher endangered species. Delivery system obstacles were outlined including silt management, weed control, encroachment, environmental pressures, and pressure for recreational uses. He then introduced James Narvaez and Leo Barrett who provided

additional information about water management and canal bank management.

JAMES NARVAEZ, Hydrology Director
Email: jnarvaez@ebid-nm.org; http://www.ebid-nm.org/wris2008/index.asp

James Narvaez, Hydrology Director demonstrated the District's ability to monitor weather and water in real-time using the Water Resource Information System (WRIS) to combine radio telemetry and database management. This capability helps the district determine water requirements from Caballo Reservoir, regulate the water delivery throughout the EBID, including delivery of water to Texas and Mexico as required by treaty and federal compacts, manage storm water and return flows, provide fast and accurate reports and provides the water users with up-to-date information about irrigation schedules and account information.

Field trip to see delivery system and weed management programs

LEO BARRETT, Maintenance Chief
Email: lbarrett@ebid-nm.org; http://www.ebid-nm.org/general/maintenance/index.shtml

Maintenance operations must be conducted on approximately 1200 miles, an area that is effectively four times the length of the canal system (there are two sides of each canal and the section inside the canal and the top of the canal bank must be managed). Maintenance operations include:

1. Scrape/cut out buildup of sediment using backhoes
2. Mowing vegetation (mowing blades)
3. Removal of mowed plant material from canals with a backhoe to prevent debris from clogging headers that open to allow water into the smaller laterals and siphon tubes going into the fields.
4. Herbicide applications to reduce weed pressure, particularly in canal bottoms.

Weeds growing on the earthen packed canals pose a major obstacle to management of the canal system. Sections of the canal system have been cemented or placed underground; however, the earthen canal system is important for recharging groundwater during the irrigation season. Therefore, effective management of the vegetation growing along the canals and levies is very important. The goal of management is to reduce the amount of vegetation growing in the canals; this is important because vegetation on the bottom of the canals restricts water flow, increases sedimentation and water loss due to evaporation. Standing water can also serve as a reservoir for mosquito reproduction. In addition, weeds that are allowed to produce seed re-infest surrounding agricultural fields resulting in additional management costs for growers. One of the major weed problems on the canal system is scouringrush (*Equisetum hyemale*); this creeping perennial plant contains silica which dulls mower blades; re-grows quickly after mowing or dredging; mowed vegetation clogs the canals; and registered herbicide treatments are ineffective. Development of new herbicide alternatives is challenging due to the fact that these canals deliver irrigation water to multiple crops during the growing season; however, the canals are dry during the winter months which may provide a window for developing new control strategies.

Left to right: a mower on the Mesilla Canal; scouringrush infestation on canal bank; after mowing debris must be raked away from the headers to ensure water flow into laterals: Gary Esslinger explains how the debri left. scouringrush stalks clogging the canal after mowing

Herbicide Application

CASEY MCGUIRE, Maintenance Foreman
Email: cmcguire@ebid-nm.org

Equipment for herbicide applications was shown to the group including:

1. Trucks for large canals (shown below)
2. ATV for small canals
3. Booms and nozzles (low pressure, low volume, precision application)

Herbicides currently used throughout the district include a tank mix of 2,4-D amine and glyphosate.

Mesilla Dam built in 1915

The water flow behind the dam is automatically regulated by gates that open and close depending on the amount of water behind the dam. The data collected at the dam is transmitted to the Hydrology Department at EBID.

EBID Turbine

The photo on the left shows the historic check structure that was used to dissipate the water flow from the Mesilla dam. Upstream from this check structure, EBID engineers have built a structure that diverts the flow of the river through a set of turbines designed to harness the energy of the water flow for generation of electricity. In the photo on the right, Henry Magallanez, Engineering Supervisor, describes the prototype structure showing the potential for using the water flow to provide green energy to the operations.

Lunch at Chope's Café – La Mesa, NM – Tour participants were able to get their first 'chile fix' of the trip!

Tuesday afternoon stops highlighted sections of NM agricultural industries:

Sustainability of New Mexico's agricultural industries, particularly our vegetable, cotton and pecan industries in southern New Mexico, relies on a number of factors including marketing of our products, efficient management of our water resources, availability of labor, and management of viruses, soilborne diseases and parasites, and insects. Weeds impact crop production as an individual pest as well as by influencing the factors described by the industry as critical threats. Effective marketing of NM crops is also critical to the sustainability of the industry; the acreage under irrigated production is small compared to neighboring states but the products are unique and of high quality; in addition, harvest timing provides unique marketing windows for the products.

Herbicides that persist in soil and provide season-long weed control are not typically used in NM because of label restrictions. Persistence of a number of herbicides (examples are some of the triazine and sulfonyl urea herbicides) is increased in soils with alkaline pH; soils in NM are characteristically alkaline with pH values between 7.5 and 8.5. Rotational crop restrictions, because of this pH requirement and because of crop sensitivity to these herbicides, reduce crop choices if these herbicides are used. In addition, due to their minor crop status, few herbicides are registered for use in many of the vegetable crops grown in NM. As a result, one of the primary uses of labor in NM production systems is to remove weeds that cannot be controlled by cultivation or the available herbicides. If labor is not available, weeds go unmanaged and yield losses result.

Joe Nelson Farms, Anthony, NM

Host Carl Moore (left photo) explains his operation including pesticide application and equipment used on the farm. His equipment includes drift reduction nozzle tips and his spray applications include drift reduction adjuvants. Granular insecticide boxes have 'lock and load' systems to reduce worker exposure. He uses more insecticide than other pesticides in his operation. He emphasized the fact that he only uses fumigants or pesticides when necessary due to cost and that all practices emphasize worker safety. Carl practices crop rotation that includes Bt and Roundup Ready cotton; he manages these and other crops to minimize the use of pesticides while maximizing the populations of beneficial organisms to prevent pest resistance. In fields close to pecan orchards, where in other areas of the valley, glyphosate resistant Palmer amaranth populations have been identified, he uses a preplant-soil residual herbicide program in cotton. His major continuing weed problem is yellow and purple nutsedge. Labor costs for hand removal of weeds range from $450 to $850/acre. Labor shortages are a growing problem; they have managed thus far by collaborating with neighboring farm operations to accomplish critical tasks.

Carl also explained how he manages his irrigation allotment each year; management of water balances need with supply throughout the season. The surface water allotment for each year (ranges from a few acre-inches to three acre-feet/season depending on supply) is announced after plans have been made for the cropping season. Carl supplements his surface water allotment with groundwater during the

season. He will save his surface water until late in the season and use it to finish off his crops; however, occasionally EBID will end the season early due to diminished supplies and he loses the opportunity to use the remaining allotment. He also works with other growers to buy and sell water during the year to supply the needs for all area farms.

Carl and David Lucero, NMDA, explained the challenges of growing high cash value crops in a small market like NM. They discussed the need to grow crops that are desirable to the public and the need to effectively market these crops in other parts of the region, the country, as well as internationally. David explained how NMDA currently has a marketing program in Washington, D.C. to introduce the nation's capital to Hatch green chiles!

Salopek Pecan Farms – North

Host: Brad Lewis NMDA/NMSU (blewis@nmda.nmsu.edu)

Richard Heerema, NMSU pecan specialist, provided information on pecan acreage in 2007 which was 582,000 acres for US and 39,000 acres for NM. New Mexico has the fourth largest pecan acreage in the United States; however, NM is usually the second or third largest producer of pecans (on an in-shell weight basis). Pecan Utilized Production Dollar Value in 2009 totalled $370 million for the US and $120 million for NM. These data show that while NM has only 6.7% of the US acreage, it produces 32.4% of the US crop on a dollar value basis. New markets for NM pecans are continually being developed; the latest market is in China.

Brad Lewis (*on the right in photo*), NMSU/NMDA, explained the history of New Mexico pecan industry and discussed orchard management practices and issues before he gave a tour of the equipment shed and pecan processing facility at Salopek Farms in Dona Ana, New Mexico.

Establishment costs for orchards are approximately $4,000 to $5,000/ acre and orchards do not begin to produce nuts until year five or six after establishment; maximum production occurs in 20+ year old orchards but trees are extremely long-lived. Water use in orchards averages 5.5 acre-ft/year; this water requirement is managed using both surface and groundwater alotments. Management of pecan orchards is complex including tree pruning, insect management and orchard floor management. The major insect pests are the pecan weevil, managed with pyrithroid insecticide, and aphids. Imidichlorprid is the primary tool for aphid management; however, resistance is becoming an issue and management of resistance is a primary research objective.

Orchard floors are primarily managed using glyphosate products. Palmer amaranth populations have been identified in pecan orchards in the Mesilla Valley that are resistant to glyphosate. These populations have been selected due to the continued exclusive use of glyphosate in orchards (resistance selection is not related to genetically modified crops). Research and education to address the resistance issue is a primary objective of the NMSU weed science extension program, led by Jamshid Ashigh.

Fan applicator orchard floor sweeper pecan tree shaker
Brad Lewis describes some of the equipment used in pecan production

Wednesday August 4, 2010:

The tour headed north from Las Cruces on Wednesday. The stops were designed to provide an opportunity for participants to discuss the different weed management objectives and methods of three federal agencies, Bureau of Land Management (BLM), Bureau of Reclamation (BOR), and U.S. Fish and Wildlife Service (FWS). Weed management programs in these rangeland and riparian areas are a long-term investment of time and resources. The stops were chosen to illustrate the goals of each agency that require unique management approaches. However, due to the very large land areas that these programs must manage with limited resources, each section of the lands around the Rio Grande is managed to some extent with herbicides. These agencies work together as much as possible, within their individual mandates to manage invasive species.

BLM brush management program, Upham/Rincon, NM

Host: Lane Hauser (Lane_Hauser@blm.gov)
Restore New Mexico (http://www.blm.gov/nm/st/en/prog/restore_new_mexico.html)

Lane Hauser, Operational Officer for BLM Brush Control Project and Margie Guzman giving "field power point presentation" brush management (photo on left).

Jill Schroeder, WSSA; Margie Guzman, Lane Hauser, and Ray Lister, BLM; Robert Avalos and Bonnie Rabe, NMDA

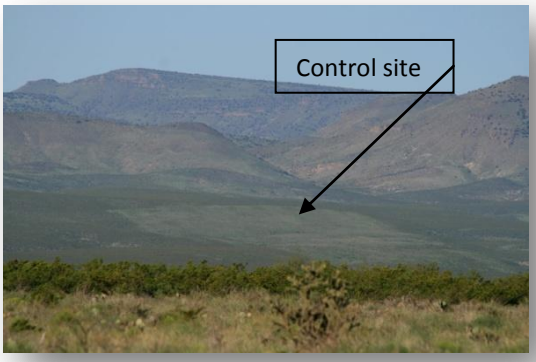
Untreated monoculture of mesquite – *photo courtesy of Dr. Kirk McDaniel*

Objective: The objective of this BLM program is to restore degraded-creosote and mesquite infested rangelands to a diverse habitat for multiple users. The restoration species include:

- Native grasses
- Wildlife species
- Grazing animals

Because of the vast acreage under BLM management, use of herbicides to reduce monoculture stands of creosote and mesquite is the only cost-effective means of restoring the areas. Aerial treatments include a pellet formulation of Spike (tebuthiuron) for creosote control in the fall and foliar treatment of Remedy (triclopyr) and Reclaim (clopyralid) for mesquite control in the spring. The rates of application and treatment recommendations were set through research conducted by NMSU in the 1980s (http://aces.nmsu.edu/pubs/_circulars/CR_597.pdf).

Treatments are made to selected blocks only after site evaluation and consultation with users and cooperators. Sites are mapped and treated using GPS guided airplanes or helicopters; riparian zones, control sites for future monitoring of treatment results, and areas harboring sensitive species are left untreated. Applications are monitored and use precision technology. *Photo at right shows a treatment site several years after treatment. Note the square pattern with clean edges indicating little to no off-target movement of the chemical.* No grazing is allowed on treatment sites for 5 growing seasons after treatment to allow reestablishment of native grasses and forbs. Treatment sites are monitored for years after treatment to assess the recovery of grasses, forbs and rangeland wildlife.



Caballo Reservoir

Host: Brent Tanzy, Bureau of Reclamation (BTANZY@uc.usbr.gov)

http://www.usbr.gov/projects/Facility.jsp?fac_Name=Caballo+Dam

The Caballo Dam and Reservoir are on the Rio Grande 25 miles downstream from Elephant Butte Dam. The dam is an earthfill structure 96 feet high and 4,590 feet long, and has a capacity of 343,990 acre-feet of water. Water discharged from the Elephant Butte Powerplant during winter power generation is impounded at Caballo Dam for irrigation use during the summer.

Beth Benbow, EPA and Brent Tanzy, BOR, overlooking a section of the reservoir that had been treated, saltcedar removed and saltgrass established

Photo on right is of the resulting saltgrass meadow.

Left photo shows uprooted saltcedar piled for burning

The management objective of the BOR is to preserve the water for the Elephant Butte Irrigation District downstream (south) of the Caballo Dam *(http://www.usbr.gov/uc/albuq/envdocs/bo/ebutte/EB-Ops.pdf)*.

Saltcedar is a major problem in the watershed of the Caballo Reservoir having become established during the drought beginning in 2003 when water levels receded. The agency is managing saltcedar with the goal to reduce the evapotranspiration losses in the reservoir area while maintaining a grass understory. The agency has two treatment options: to mow annually or to treat with low rates of herbicide every 3 or more years. The herbicide treatment is more cost effective (fuel and labor). The agency personnel treat the stands of saltcedar (4,000 to 8,000 or more plants /acre) with imazapyr applied at a low rate (1 pt product/acre) either by placing the chemical onto plants with a carpet roller or applying a ground spray treatment. The treatment injures the saltcedar (stand reduction occurs over time) without affecting the grass understory and, overall, reduces ET losses as measured by instrumentation located at the reservoir.

Application equipment: Left photo is a custom made carpet roller; right photo is the sprayer used to treat salt cedar where the nozzles emit a spray stream reducing potential for off target movement of herbicide.

Bosque del Apache National Wildlife Refuge
http://www.fws.gov/southwest/refuges/newmex/bosque/
Hosts: John Vradenburg (John_Vradenburg@fws.gov) and Bernard Lujan (Bernard_Lujan@fws.gov)

Photo on left: Dan Kenny,EPA; John Vradenburg, FWS; Dave Thompson, NMSU; Skee Jones, EPA

The Bosque del Apache is managed by the U.S. Fish and Wildlife Service. The refuge is located on the Rio Grande in central NM and north of the Elephant Butte and Caballo Reservoirs; the river has not been channelized or altered in this region of the state. "The goal of refuge management is to provide habitat and protection for migratory birds and endangered species and provide the public with a high quality wildlife and educational experience." John Vradenburg discussed one of the Bosque's long-term projects which has been to control monoculture stands of saltcedar and restore the native vegetation in the refuge to enhance and preserve habitat for water fowl (http://www.fws.gov/southwest/bhg/Literature/newpage12.htm).

The restoration species include saltgrass, screwbean mesquite, black and coyote willow, and cottonwood. Restoration requires years of careful management to be successful. The group discussed the impact of saltcedar management on endangered species including the southwestern willow flycatcher. They discussed how increasing plant diversity appears to benefit the bird populations in the refuge.

John and Bernard Lujan showed the group a previously infested area that had been aerially treated several years ago. Dead saltcedar had recently been removed and debris piled for later burning. They described how the area will be leveled and irrigation timed and carefully applied to stimulate germination of desirable species.

Saltcedar stand before treatment at the Bosque del Apache-*photo courtesy of Dr. Kirk McDaniel.*

Equipment used to remove dead trees and roots 2 to 3 years after herbicide application. The time interval is required to maximize herbicide effect on tree roots.

Restored sites

Final Stop: The tour ended with dinner and discussion at Peppers in Old Mesilla, NM.

Tour Participants:

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The hosts of the tour stops were Gary Esslinger, James Narvaez, Leo Barrett, Casey McGuire, and their associates, Elephant Butte Irrigation District; Carl Moore, Joe Nelson farms; Brad Lewis, NMDA/NMSU; Lane Hauser, Margie Guzman, and Ray Lister, BLM, Las Cruces District Office; Brent Tanzy, BOR; and John Vradenburg and Bernard Lujan, FWS. The tour participants greatly appreciated the time and effort spent by all these individuals in helping with the tour and for sharing their expertise with the group.

Respectfully submitted,
Jill Schroeder, WSSA SME