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## **Public Perceptions of Floodplain Issues in Douglas and Lyon Counties, Nevada**

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Riverfront or riparian ecosystems were some of the first areas in which people settled in the arid western United States. Human settlements were often built on floodplains, the level lands adjacent to rivers that are formed by the deposition of sediment during periodic floods. Floodplains store water during floods, reducing damage to downstream communities. They also provide natural habitat for many species of birds and wildlife. Human activities that remove streamside vegetation, such as wetland drainage, overgrazing, flood levees and urban development, jeopardize a river's ability to perform these functions (Poff et al., 1997).

Agencies, organizations and researchers are turning to a "living river approach" to restore altered river banks and floodplains. This approach recommends keeping mapped flood zones within the river corridor in natural states or in agricultural and ranch land uses. When river flows increase, they spill out across the floodplain, reducing flood velocities, improving water quality and benefiting wildlife habitat. Keeping structures from being built in unsafe locations near valley bottom channels provides natural, no-cost

flood protection (CWSD, 2008). However, it becomes more challenging and expensive to restore "living rivers" as floodplains become developed (Hascic and Wu, 2006).

Efforts to address bank erosion, water quality impairment and riparian degradation along the Carson River began in the early 1990s. A devastating flood in 1997 led to a more coordinated approach to river restoration. In 1998, a watershed group known as the Carson River Coalition (CRC) formed and supported restoration projects as well as broad community education about watershed and floodplain issues. The CRC also wrote the Carson River Watershed Regional Floodplain Management Plan (2008). This plan, which recommends the living river approach, was adopted by all five Nevada and California counties in the watershed.

Despite these efforts, past community support to fund such initiatives has been mixed. In 2002, voters in Lyon, Churchill and Storey counties rejected a statewide ballot initiative to spend up to \$200 million for the protection of parks, open space, lakes, rivers, wetlands and wildlife habitat (Nevada Secretary of State, 2002). Furthermore, in 2006, voters in Douglas

and Lyon counties rejected an initiative to raise the local sales tax rate by one quarter of 1 percent to provide funding to preserve and increase the counties' open space, farmland, stream corridors and shorelines (Nevada Secretary of State, 2006). It appears that the general community's understanding of the issues facing the Carson River is insufficient to motivate financial support for protection.

Addressing the issues of the Carson River will most likely take the support of many nonprofit organizations, landowners and voters. To better understand how community members perceive Carson River floodplain restoration issues, a mail/Internet survey was completed in fall 2009. The issues and concerns included in the survey were identified in watershed meetings and workshops during fall 2008 and spring 2009. These issues are also found in the Carson River Stewardship Plan (CWSD, 2007) and Floodplain Management Plan (CWSD, 2008). The survey focused on registered voters who live within the Carson River watershed in Douglas and Lyon Counties.

## **SURVEY METHODS**

Before the survey was mailed, it was sent to more than 25 organizations in northern Nevada for review. Two pilot studies were also conducted in Carson City. Survey respondents were chosen at random from lists of registered voters whose mailing addresses lie within the Carson River watershed boundary in both counties. Paper and Internet versions of the survey were sent to 1,516 people in Douglas County and 1,492 people in Lyon County.

Similar questions were grouped together into five sections:

1. If and how voters use the Carson River and its floodplain.
2. How voters view current and future issues facing the river and its floodplain. The issues identified included water availability and quality, wildlife habitat, development restrictions, riparian area restoration, flood risk and agricultural preservation. This section also asked if voters had read about watershed or floodplain issues, if they had been involved with restoration projects, and if they had voted in the past in support of land conservation.
3. Land ownership and demographic characteristics.
4. General location of residence in the floodplain.
5. Additional comments.

The responses from the survey were first analyzed together and then results from each county were compared to determine differences between the voting communities.

## **RESULTS**

Of the 735 usable surveys received (24% response), Douglas County voters returned 376 surveys (25%) and Lyon County voters returned 359 (24%). Based on the response rate, the survey was a good representation of registered voters who live within the Carson River watershed.

While only a few respondents (2.3%) reported involvement with real-estate

## Public Perceptions of Floodplain Issues in Douglas and Lyon Counties, Nevada

development, about half (49%) donated to or participated in groups that focus on wildlife, outdoor recreation or land preservation; habitat conservation; and wilderness protection. More than 75% of the respondents reported reading about watershed or floodplain issues or following issues of neighboring rivers. Of those who reported “yes” or “no” to voting for or against past conservation bond initiatives, 63% reportedly voted in favor of spending public funds on land conservation. Respondents tended to be river and floodplain recreationists and those familiar with watershed issues. Popular activities are shown in Table 1.

Respondents were also likely to have favorable attitudes toward land conservation and development restrictions. Water quality was the most common concern among voters within the Carson River Watershed (Table 2). This was closely followed by concerns about future water availability for ecosystem health and

**Table 1. How respondents reported using the river and its riparian area**

Activities	Users
Fishing in the river	33%
Boating in the river	20%
Engaging in recreational activities adjacent to the river	85%
Walking	56%
Watching wildlife	56%
Fishing (from the banks)	39%
Habitat to support wildlife	37%

wildlife habitat restoration. Most (84%) of the respondents agreed that agricultural land conservation is essential to protect the river and preserve the valley’s rural identity (Table 3). About the same number of people believed that development restrictions within the floodplain would protect open space, wildlife habitat and river corridor (Table 4).

Survey respondents from both counties

**Table 2. Douglas and Lyon County respondents combined level of concern about nine Carson River issues**

I am concerned about...	Don't Know	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
Water quality	3%	1%	1%	5%	12%	77%
Future water availability for ecosystem health	3%	1%	2%	10%	22%	60%
Restoring wildlife habitats (streamside forests, wetlands, wet meadows)	3%	2%	2%	11%	21%	59%
Maintaining fish habitat	2%	1%	2%	11%	24%	58%
Future water availability for agriculture	3%	3%	2%	11%	23%	55%
Flood control	4%	3%	2%	13%	22%	53%
Future water availability to maintain status quo	4%	3%	3%	15%	22%	50%
Controlling noxious weeds (ex. tall white top)	8%	2%	2%	16%	23%	46%
Future water availability for urban growth	2%	12%	9%	13%	17%	44%

**Table 3. Responses to four statements about the Carson River**

Statements about the Carson River	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
“Preservation of the agricultural fields along the river channel is critical to protect the Carson River and the rural identity of the river’s valleys.”	2%	3%	10%	28%	56%
“Urban development seriously threatens the Carson River and its floodplain.”	3%	6%	11%	32%	46%
“I feel responsible for supporting land conservation for watershed health.”	3%	3%	20%	35%	37%
“I feel personally responsible for providing and maintaining desirable vegetation on my land to protect watershed health.”	3%	4%	21%	28%	33%

**Table 4. Douglas and Lyon County respondents combined perceptions of potential benefits associated with restricting urban development within the Carson River floodplain.**

Potential benefits from restricting urban development within the Carson River floodplain...	Don't Know	Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree
Protects open space	2%	3%	1%	6%	20%	64%
Protects wildlife habitat or corridor	1%	2%	2%	6%	21%	62%
Promotes scenic views or amenity value	2%	2%	2%	8%	22%	59%
Retains agricultural production	2%	3%	4%	14%	30%	43%
Promotes a desirable quality of life	2%	3%	1%	9%	23%	58%
Protects water quality	5%	3%	2%	8%	22%	56%
Offers recreational opportunities	2%	2%	3%	11%	26%	51%
Protects rare or endangered species habitat	5%	3%	3%	14%	22%	48%
Provides flood protection	4%	3%	5%	12%	22%	48%
Enables riparian ecosystems to be restored	9%	3%	2%	15%	21%	45%
Preserves cultural/historical resources	4%	3%	3%	14%	30%	42%
Provides educational opportunities	5%	3%	6%	22%	28%	31%

tended to be middle-aged property owners, users of the Carson River, and supporters of land conservation. Their ages ranged from 19 to 92 years, with an average age of 56. Many respondents (45%) had a four-year or post-graduate college degree, and 42% had attended some college. Ninety percent of all respondents (n=720) were landowners, and 13% (n=85) of the landowners owned property zoned for agriculture. Of those who

responded to the question (n=719), only 6% reported that they owned land next to the Carson River, yet 24% reported that the Carson River influenced their place of residence. Length of county residency ranged from 3 months to 69 years, with a median of 14 years.

Comparing the characteristics of the survey respondents to U.S. Census data from 2000 for the two counties

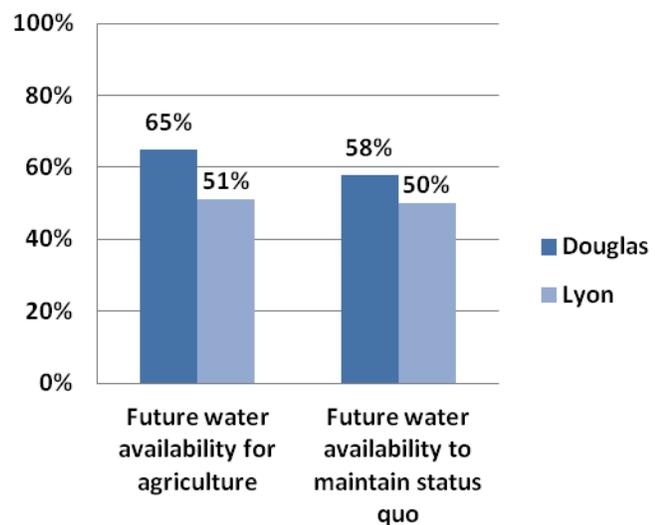
revealed that survey respondents differ from the county at large. Respondents were older and more likely to hold a university degree than the general population of either county. In addition, survey respondents in Douglas County were 17% more likely to be property owners than the general population, and respondents in Lyon County were 21% more likely to be property owners. Despite the differences from the general population of each county, the survey respondents were similar demographically and characterize the portion of the population that has voted in the past to support land conservation initiatives.

### Douglas and Lyon County Comparisons

By looking at differences in the responses between the two counties, we can provide restoration practitioners with location-based knowledge, perceptions, and educational needs. Douglas County respondents agreed with all survey statements more consistently than did Lyon County respondents. Douglas County voters were also more concerned about future water availability for agriculture and maintaining the status quo than voters of Lyon Counties (Figure 1).

More respondents from Douglas County reported they “strongly agree” with feeling responsible for supporting land conservation for watershed health and were concerned about the preservation of agricultural land along the river channel to protect the Carson River and rural identity (Figure 2). Statistical analysis showed that

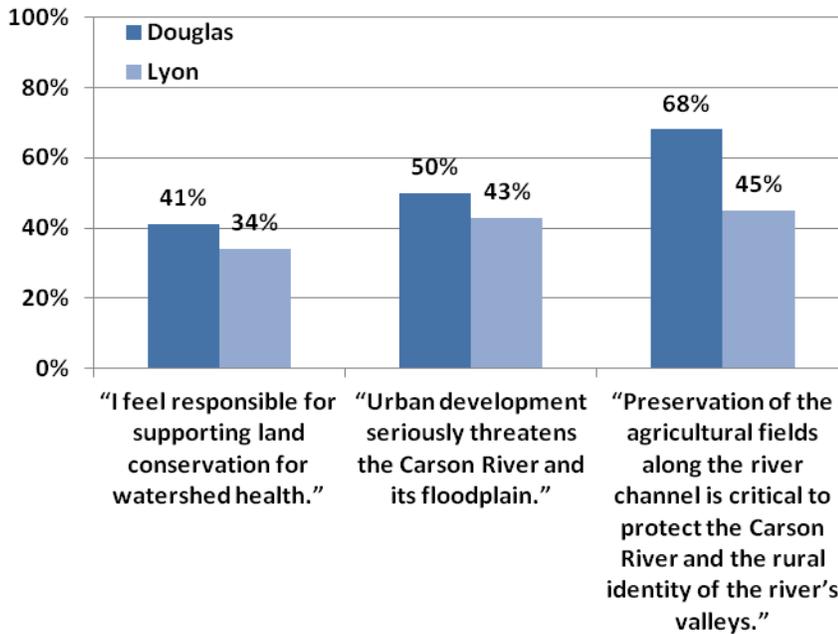
**Figure 1. County-based concerns about the Carson River and its resources**



significantly ( $p < .001$ ) more respondents from Douglas County also “strongly agreed” with over half of the listed potential benefits from development restrictions within the floodplain than respondents from Lyon County (Table 5).

Respondents from Douglas and Lyon counties used the Carson River water and floodplain somewhat differently. More people from Douglas County use river water to irrigate than Lyon County (10% vs. 6%). Significantly more people in Lyon County used off-road vehicles (ORV) on public land adjoining the Carson River (27% vs. 20%,  $p < .001$ ). A larger proportion of residents in Lyon County reported that the Carson River influenced their decision to buy or rent property at their current residence (27% vs. 21%, respectively). While more people in Lyon also tended to consider the Carson River a feature of their quality of life (8% vs. 2%), the percentages were small compared to the number of total responses to land use activities.

Figure 2. County-based opinions about the Carson River



Involvement with river and floodplain issues differed in some respects as well. Lyon County residents engaged in significantly more activity ( $p < .001$ ) by donating or participating in groups that focus on habitat conservation (43% vs. 25%), ORV recreation (27% vs. 20%) and public land acquisition (16% vs. 10%). However, more Douglas County respondents reported learning about local river and watershed issues by attending floodplain workshops (12% vs. 8%) or reading about local watershed issues (73% vs. 64%). Despite these differences, similar numbers voted in favor of land conservation in Douglas (67%) and Lyon (59%) Counties.

Douglas County respondents tended to be more highly educated and to have lived in the county longer. The median length of county residency was significantly longer in Douglas (13 years) than Lyon (10 years).

Lyon County had a larger population of residents who have lived in the county for less than six years (31% vs. 18%, respectively) whereas Douglas County had a more voters who have lived in the county for over twenty years (26% vs. 16%, respectively). More Douglas County survey respondents had received a college degree than in Lyon County (54% vs. 37%, respectively).

**DISCUSSION & CONCLUSIONS**

This survey reflects perceptions and experiences towards floodplain protection of residents of the Carson River watershed. Respondents often used the floodplain for recreation and they were generally concerned about the aquatic and terrestrial ecosystems. Many believed that urban development within the floodplain

Table 5. Percent of those surveyed in Douglas and Lyon Counties who strongly agree with each statement.

Potential benefits from restricting urban development within the Carson River floodplain...	Douglas	Lyon
Retains agricultural production	57%	34%
Provides flood protection	57%	48%
Promotes scenic views or amenity value	71%	57%
Protects water quality	65%	58%
Promotes a desirable quality of life	69%	55%
Protects open space	75%	62%
Enables riparian ecosystems to be restored	56%	50%

threatens the river. Those who chose to respond to the survey tended to have lived in the area longer, have been involved with watershed activities and educational efforts, and voted to support land conservation.

For this reason, in order to reach new audiences, future educational efforts about watershed issues should target voters younger than 55, non-landowners, and new residents of both counties, with Lyon County taking priority.

Residents' priorities in Douglas County focus more consistently on agriculture preservation, while public access to floodplain lands, particularly for river access and ORV use, were more strongly supported in Lyon County. This may be because Lyon County is more rural, and population centers lie farther from the river than in Douglas County.

The differences in perceived benefits between residents in Douglas and Lyon Counties may be due to differences in land ownership between the two counties. Douglas County has more land zoned for agriculture, while the Bureau of Land Management and the U.S. Fish and Wildlife Service own most of the lands that surround the Carson River in Lyon County. The perceived threat of development on private lands may be stronger than on public lands. Due to the strong link between recreation and public access to the river, there may be greater support for public land conservation in Lyon County that guarantees public access to those lands.

While the majority of the respondents

value both agricultural lands and riparian health, fewer respondents associated development restrictions with ecosystem restoration. With greater support for agricultural land preservation than personal responsibility for watershed health, the public may view agricultural landowners as responsible for maintaining riparian ecosystems. It is possible that residents will be more supportive of agricultural land conservation as evidence of ecological restoration on private land becomes more widespread.

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