Multi-Purpose Development of the Gila Drain Floodway, Phase II

Quarterly Progress Report, April-June, 1995

Submitted to the

Flood Control District Of Maricopa County

The Center for Agribusiness Policy Studies

Arizona State University
Tempe, Arizona 85287-3306

August 29, 1995

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Tempe, Arizona 85287-3306
602/965-3585
FAX: 602/965-5961

August 31, 1995

Mr. Richard Perreault, Planning Director
Flood Control District of Maricopa County
2801 West Durango
Phoenix, Arizona 85009

RE: Quarterly Report for Gila Drain Floodway Project, Phase II

Dear Mr. Perreault:

Enclosed please find three copies of our Quarterly Progress Report for the period April through June, 1995.

Please call if you have any questions regarding this report or any corrections or additions that you feel should be included.

Thank you very much.

Sincerely,

Dan Shaffer

Daniel C. Shaffer
Project Coordinator

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Quarterly Progress Report, April - June, 1995

The following report summarizes project activities and accomplishments from April 1 through the end of June, 1995 under Phase Two of the project entitled "Multi-Purpose Development of the Gila Drain Floodway".

To summarize, there were two primary activities during this period. The first, coordinated by Dr. John Brock, consisted of continued monitoring of test plantings in the Gila Drain Floodway area of the Gila River Indian Community. The second activity consisted of continuing consultations with the Gila River Indian Community and the Flood Control District of Arizona regarding future development plans which will impact the type of revegetation and reforestation feasible and desirable within the project area.

Task 1.0 Project Design and Site Preparation

(See Q4, 1994 Report)

1.1 Archaeological Assessment: 100 % Complete (Waived)

1.2 Demonstration Site Plan: 100% Complete in Q4, 1994

1.3 Site Preparation: 100% completed in Q4, 1994

Task 2.0 Project Implementation

2.1 Demonstration plantings: 100% completed in Q4, 1994

2.2 Descriptions & protocols for control plantings: 100% complete

Descriptions and protocols for control plantings were completed by Dr. John Brock during the month of January, 1995 and were included in the Quarterly Report for the period ending December 31, 1994, as well as an Appendix to the Quarterly Report for the First Quarter of 1995.

2.3 Monitoring Results

Vegetation emergence and survival is being monitored on the demonstration research site in the following manner. Each plot is being sampled using 3 randomly located line transects. The distance for the start of each transect was measured from the left plot corner and the random distance for each of the 3 line was recorded. Along each 10 m line in the plot, 4 quadrants 0.25 m^2 in size are placed at the 2, 4, 6, and 8 m distances along each line.

Thus, for each sampling period, vegetation monitoring data is collected, as close as is possible, from the same point. This ensures that data comparisons between dates is from the same plant populations not from variation in the parts of the plot being sampled.

Emergence data was collected in late February 1995. The first survival data was collected in late April 1995 with the beginning of the "normal" drying spring season.

2.3.1 Emergence Results

February 1995 monitoring results showed that none of the warm season grasses (purple 3-awn, sand dropseed, spike dropseed, alkali sacaton) had emerged and that desert senna, a warm season perennial forb also had not emerged from the early December 1994 plantings.

Forb is a term utilized by rangeland ecologists to differentiate herbaceous plants. A forb is a broadleaf herbaceous plant, typically what many persons might call a wild flower. Since the term herbaceous plants includes grasses, grass-like plants, and wildflowers, the term forb is used to separate the lifeforms of herbaceous materials.

Average emergence data is presented in plants/m^2. Salt bush plants are very hard to distinguish to species during the early seedling stages, so this early data has the salt bush species pooled.

Species	Emergence density (number/ m^2)		
Salt bush(s)	**12.3**	**Globe mallow**	**1.2**
Desert marigold	**11.0**	**Annual grasses**	**80.6**
Brittle bush	**3.1**	**Annual forbs**	**25.8**

The annual grasses category was primarily made up of Mediterranean grass (*Schimus* barbatus) and wheat the grew from seed in the straw mulch. Annual forbs were a more diverse group of plants but was dominated by fiddle neck (*Amsinckia sp.*).

The summarized emergence data from the plots is presented in Table 1. below.

Table 1. Emergence data (plants/m^2) for species seeded on areas with no soil removed, about 0.25 m of top soil removed, and > 1.0 m of soil removed with and without straw mulch.

	Soil Removed					
	None		0.25 m		>1.0 m	
Mulch	yes	no	yes	no	yes	no
Species						
Salt bush	11.5	9.8	11.9	10.1	17.2	13.7
Desert marigold	11.4	12.6	6.4	6.8	13.9	15.2
Brittle bush	2.7	3.3	0.8	2.5	5.6	4.0
Globe mallow	0.2	0.4	2.9	0.7	1.2	2.3
Annual grasses	90.7	107.5	59.5	37.5	102.5	85.7
Annual forbs	28.5	45.1	21.7	12.9	23.2	23.6

Salt bush seedlings were most common planted species, but is a composite score for 3 species. It appeared that 4-wing salt bush and quail salt bush were the most common seedlings. For all species, mulching did not greatly influence seedling emergence.

The benefit of mulch presence may be realized as the plants strive for survival and establishment. Seedling annual grasses were very common, with the least numbers being found on the 0.25 m soil removed area.

The surface soil in that treatment is largely an argillic (clay) horizon in which plant growth is more difficult. Soils of the >1.0 m area are coarser in texture and appears to allow better plant emergence.

The range of numbers for the species and the average number of plants/m^2 for mulch and no soil cover and for all soil depths is as follows:

	Range	Mulch	No Cover
Salt bush	0 - 52.0	13.5	11.2
Desert marigold	0 - 30.7	10.6	11.5
Brittle bush	0 - 17.0	3.0	3.3
Globe mallow	0 - 7.0	1.4	1.1
Annual grasses	0 - 150.0	84.2	76.9
Annual forbs	0 - 55.7	24.5	27.2

2.3.2 Seedling Survival

Seedling survival data was collected for the winter emerging seedlings in late April 1995. As anticipated, seedling survival appeared to be heavily influenced by decreasing rainfall and increasing temperatures. These 2 weather features are exerting a major stress on the planted vegetation. Comparing the February to the April data the following information was developed concerning species survival.

Salt bushes.....23% survival

Globe mallow.....36% survival

Desert marigold.....54% survival

Annual grasses.....6% survival*

Brittle bush.....24% survival

Annual forbs.....9% survival*

* Annual plants had flowered and produced seed. This normal part of their life cycle was completed for most of the population by the April monitoring period.

In late April, some of the desert marigold and globe mallow were flowering. The plants that were blooming were normally found on the southern exposure of the contour ridges installed as water conservation measures. Some brittle bush plants were beginning to develop their mature growth form by producing multiple branches.

No warm season perennial grasses, or desert senna was observed on the site in April. It is anticipated that those species will begin being represented in the flora with the benefits of summer rainfall.

The following table presents the results of the monitoring activity for April 1995.

Table 2. Survival data (plants/m^2) for species seeded on areas with no soil removed, about 0.25 m of soil removed, and >1.0 m of soil removed, with and without straw mulch.

	Soil Removed					
	None		0.25 m		>1.0 m	
Mulch	Yes	No	Yes	No	Yes	No
Species						
Salt bush(s)	3.0	2.6	10.4	4.6	4.1	3.8
Desert marigold	8.1	7.3	2.5	4.5	4.5	9.8
Brittle bush	0.1	0.2	0.5	0.7	0.9	2.1
Globe mallow	0.0	0.2	0.3	0.7	0.2	1.1
Annual grasses	5.3	0.3	2.5	2.7	15.1	14.0
Annual forbs	10.3	3.0	6.1	1.8	5.2	7.2

Mulch appears to be helping the survival of salt bushes on the clayey soil site (0.25 m removed). For other sites, survival was not greatly influenced by mulch at this point.

The annual grasses that remained green at this sampling date were found primarily in areas were water storage occurred. This was especially true on parts of the >1.0 m soil removed area where rabbitfoot grass was common. Survival rates of plants observed during the April monitoring activity is anticipated to decrease with the summer season.

The range of numbers for survival of the planted species and the average number of plants /m^2 for mulch and no soil cover and for all soil removed depths is as follows:

	Range	Mulch	No Cover
Salt bush	0.3 - 22.0	5.8	3.7
Desert marigold	0.3 - 21.7	5.0	7.1
Brittle bush	0.0 - 6.0	0.5	1.0
Globe mallow	0.0 - 4.0	0.2	0.7
Annual grasses	0.0 - 33.7	5.0	5.7
Annual forbs	0.0 - 20.7	7.2	4.0

The overall average April 1995 survival by species or plant life form in plants/m^2 was

Salt bush(s).....2.9% survival

Globe mallow.....0.5% survival

Desert marigold.....6.0% survival

Annual grasses.....5.3% survival

Brittle bush.....0.8% survival

Annual forbs.....2.4% survival

The most common green annual forb observed in the April monitoring was a knotweed. Most of the annual grasses and forbs

were in the mature stage and were dispersing their seed.

2.3.2 Future Monitoring

Future work will include monitoring of the herbaceous vegetation and survival of velvet and screwbean mesquite seedlings following summer rains. It is anticipated the next sampling period will be in September or October.

Task 3.0 Revegetation Plan Development

3.1 Monitor GRIC area planting: 50 percent complete

During the second quarter of 1995, project management continued to participate in the monitoring of the test and control plantings established during the last quarter of 1994.

3.2 Develop conceptual Master Plan and budgets: 10% complete

Several meetings were held during the Quarter at which project personnel met with representatives of the Gila River Indian Community (GRIC) to discuss development of a conceptual master plan. Issues addressed at a June 22 coordination meeting included the following:

1. **Phase III Implementation**: It was observed and agreed that Phase III, implementation of a revegetation / reforestation plan, will depend upon GRIC development plans and the availability of funding. It seems likely that the project may be implemented piecemeal, area by area, resulting in a sort of checkerboard approach rather one single project.

2. **Need for Guidelines from GRIC**: It is clear that in order to develop a draft master plan for revegetation/ reforestation, it is necessary to first receive guidelines from the GRIC concerning the nature and extent of anticipated future development. It was learned that the GRIC is beginning a community planning process to update and revise the original Borderlands Conceptual Development Plan. Project personnel will stay in close communication with GRIC personnel in order to incorporate the revised Borderlands plan into a conceptual master plan for revegetation and reforestation.

3. **Enlargement of Basin B**: It now appears likely that the stormwater retention basin known as "Basin B" will probably be larger than originally planned. It was initially designed just to capture peaking flows. A consequence of this larger design will be a reduction of peak storm flows coming into the Gila Drain Floodway.

4. **Less Borrow Material to be Removed**: It now appears that less borrow material for highway construction will be needed from the Floodway area than ADOT originally thought. As a result, future excavation in the floodway are not likely to extend to 32nd Street as originally conceived.

5. **Stormwater Runoff Problems to the North**: There has been a continuing scour problem caused by storm runoff from Southeast Phoenix (e.g. Ahwatukee area) flowing across

the fields of reservation farmers in the agricultural area just north of the Gila Drain Floodway.

ADOT takes the position this flooding problem is the responsibility of the City of Phoenix, but the City has not officially accepted responsibility as yet. Solutions to this problem will probably involve intercepting and conveying the problem storm runoff to the Floodway.

6. **Relocation of Gila Drain**: Another issue impacting this project is the as yet unresolved question of whether the portion of the Gila Drain passing through the Lone Butte Industrial Park should be abandoned and relocated to the West of the I-10 freeway. If it is relocated, this will also impact the upper portion of the Gila Drain Floodway.

3.3 Summary of alternative plans with input: 0% complete

Future Activity. No accomplishments to date.

3.4 Recommendations for revegetation: 0% complete

Future Activity. No accomplishments to date.

Task 4.0 Project Coordination: 67% complete

Project coordination activities during the second quarter of 1995 included the following four areas of activity:

1. **Continuing Consultations with GRIC**: There were continuing consultations with the Gila River Indian Community and the Flood Control District of Arizona regarding future development plans which will impact the

type of revegetation and reforestation feasible and desirable within the project area.

2. **Strengthening of GRIC Professional Staff**: During the second quarter of 1995, the GRIC added a number of well qualified and experienced professionals to its staff, including Dr. Patricia Mariella who is the Director of a newly-formed Department of Environmental Quality. These new staff resources, together with the highly competent senior staff persons already employed, will be very helpful in resolving the many, interconnected issues that will impact design of a future Gila Drain Floodway.

3. **Discussion of Potential Funding Sources**: Potential sources of future funding and assistance may include the EPA for wetlands restoration, the Arizona Heritage Fund which receives lottery revenues, the Bureau of Fish and Wildlife, and the Army Corps of Engineers which is getting more and more involved with habitat restoration.