

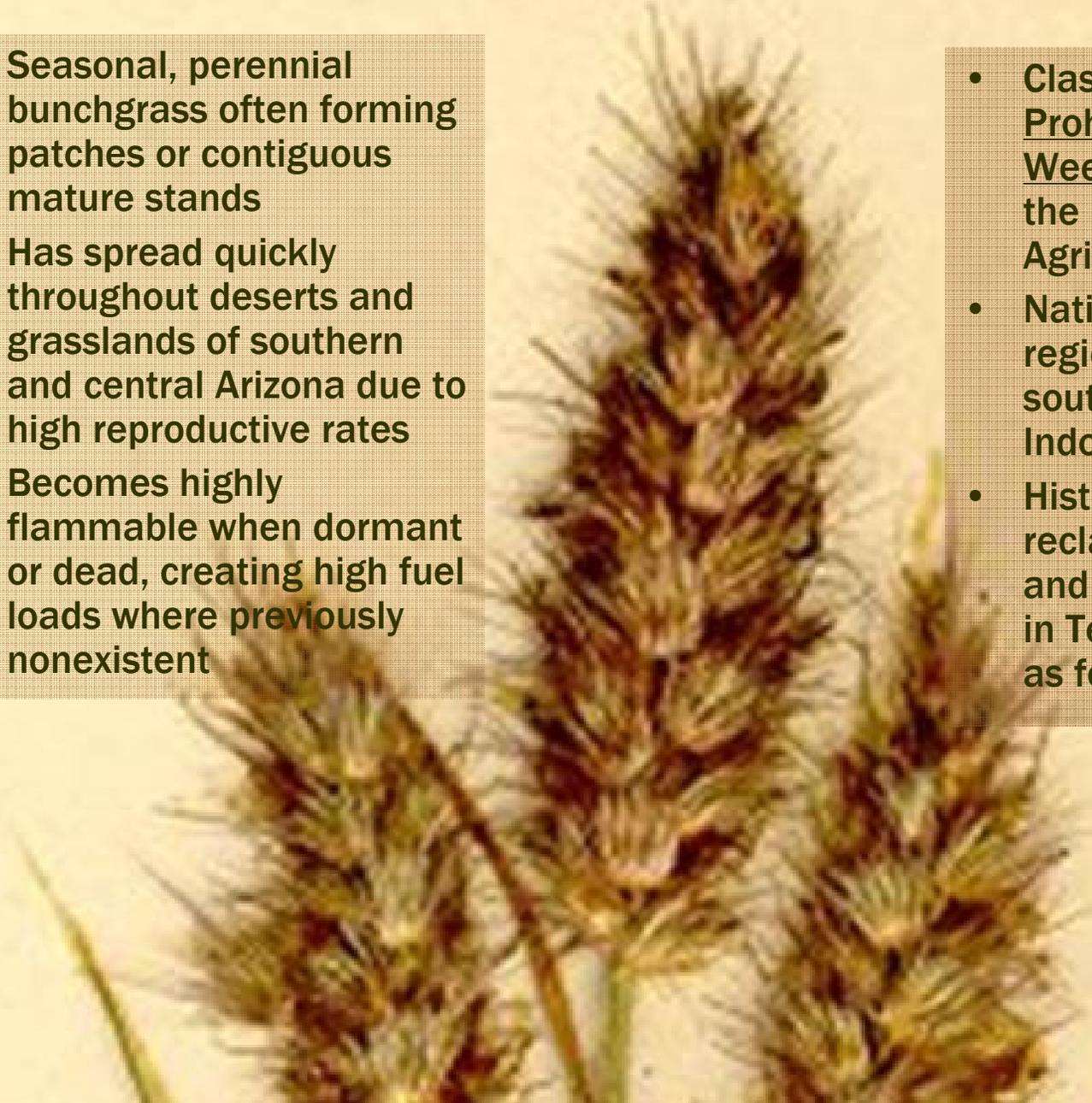
**Buffelgrass (*Pennisetum ciliare*):  
A Management Program for  
Natural Resource Management  
Group, Tucson – Office of  
Environmental Services, Arizona  
Department of Transportation,  
Sarah Karasz, Darin Kelly, Chuck Barclay; ADOT Natural  
Resource Management Group - Offices of Environmental  
Services**



## Background Information

- Seasonal, perennial bunchgrass often forming patches or contiguous mature stands
- Has spread quickly throughout deserts and grasslands of southern and central Arizona due to high reproductive rates
- Becomes highly flammable when dormant or dead, creating high fuel loads where previously nonexistent

- Classified as a Prohibited Noxious Weed according to the Arizona Dept. of Agriculture
- Native to arid, sandy regions of Africa, southern Asia and Indonesia
- Historically used for reclamation projects and presently planted in Texas and Sonora as forage for cattle



# Defining The Problem

- **Management area consists of 3,745 shoulder miles**
  - Encompasses 40,195 right-of-way acres
  - Estimated infested acreage - 2,406 acres within management area
- **Infestation density varies based on topography, soils, elevation, and regional climate differences**
- **Occurrence: individuals, patches, and large monotypic stands.**
- **Level of infestation: road edge stands, scattered colonies, and remote endpoints**

# “Containment Strategy”

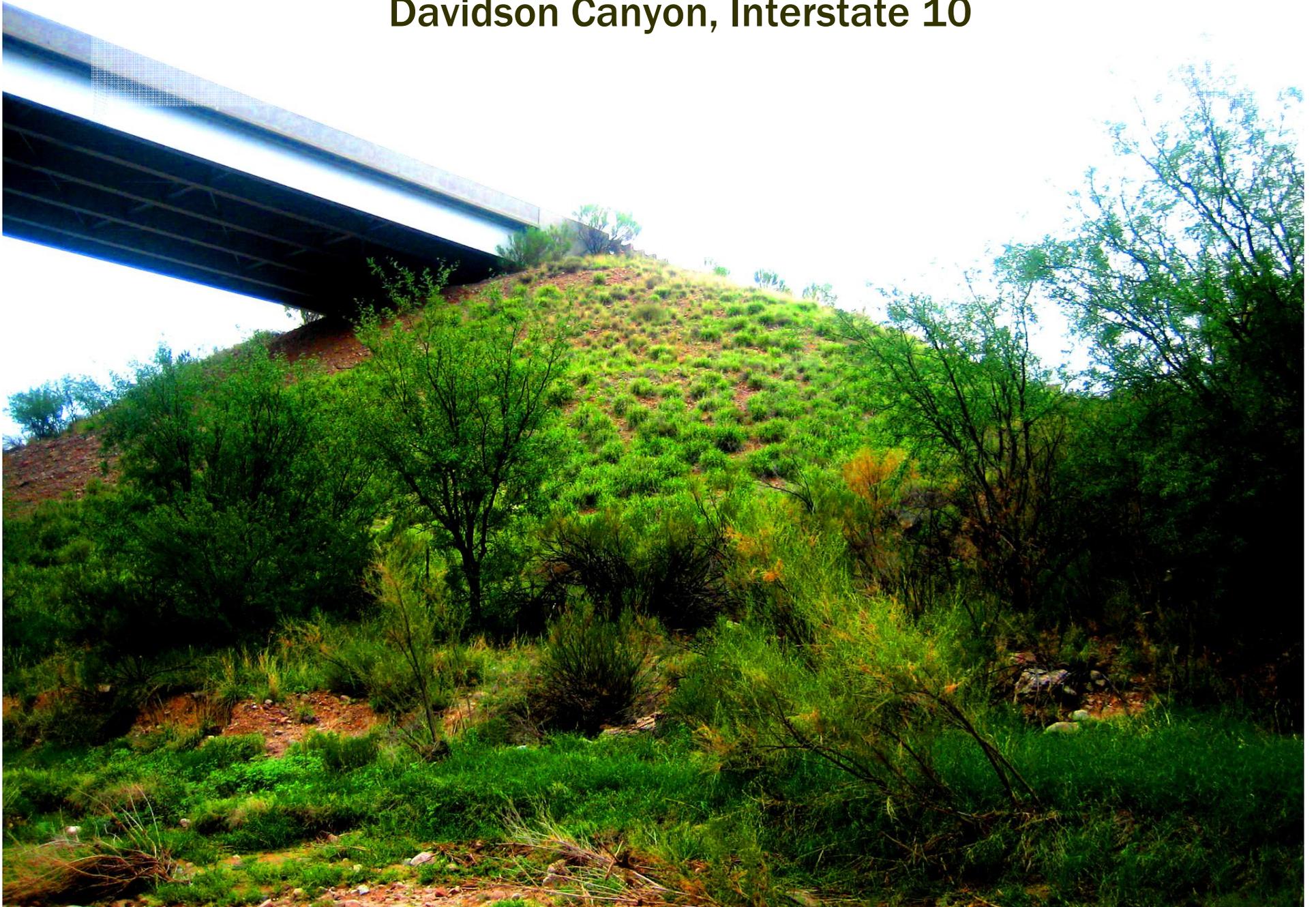
- Inhibit future spread and reduce the extent of infestation
- Protect sensitive areas
- Maximize efficiency of available resources – “Bang for the buck”
- Contain geographic center of infestation – metro Tucson
- Combine survey and treatment activities



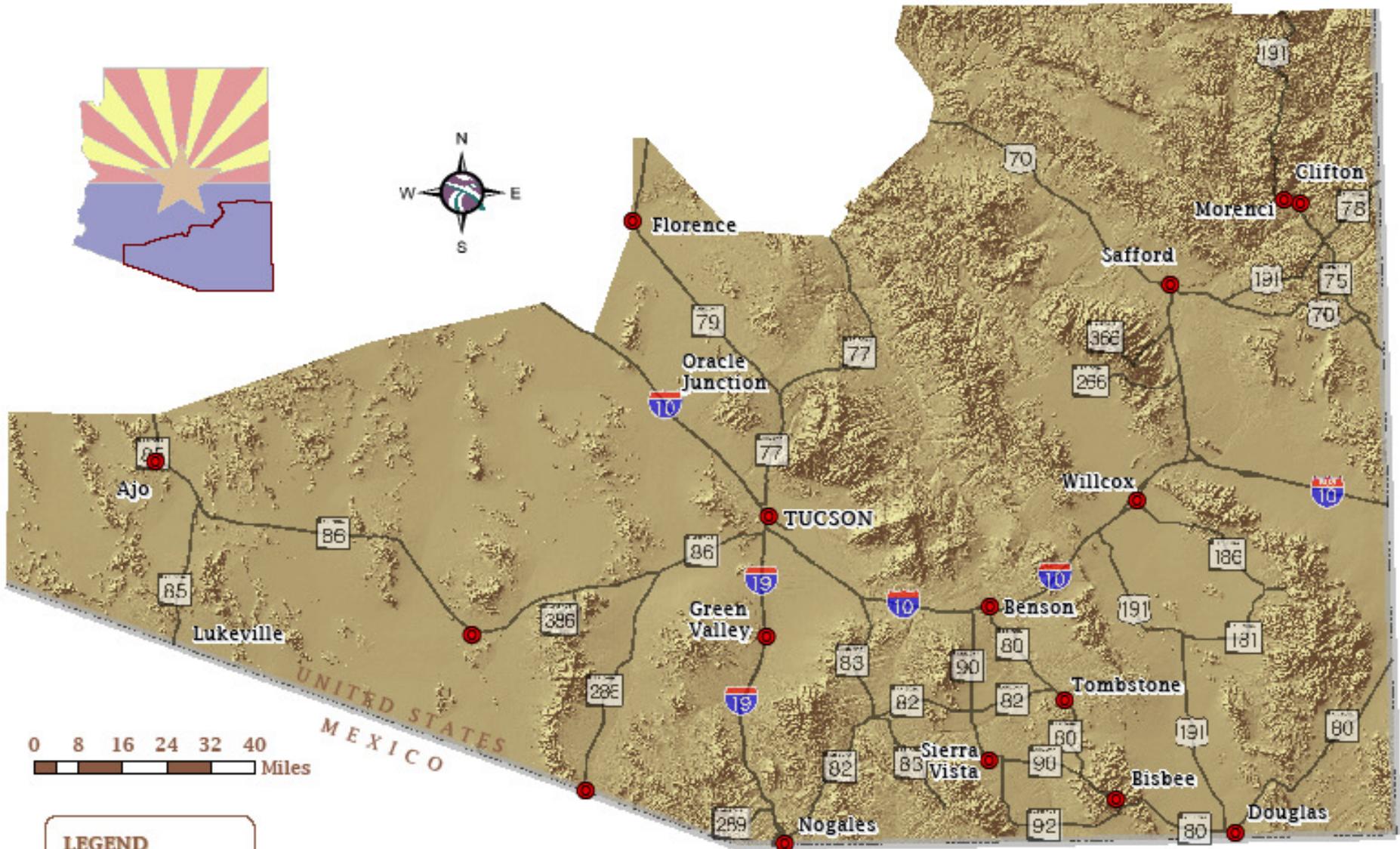
# Management Planning

- Analysis of management area
- Assessment of seasonal treatment variations
- Review past and current precipitation
- Determine application method and equipment by route, occurrence, and level of infestation
- Assess stand characteristics over the management area
- Consideration of travel time to colonies and endpoints

## Davidson Canyon, Interstate 10



# Tucson Natural Resources Management Group

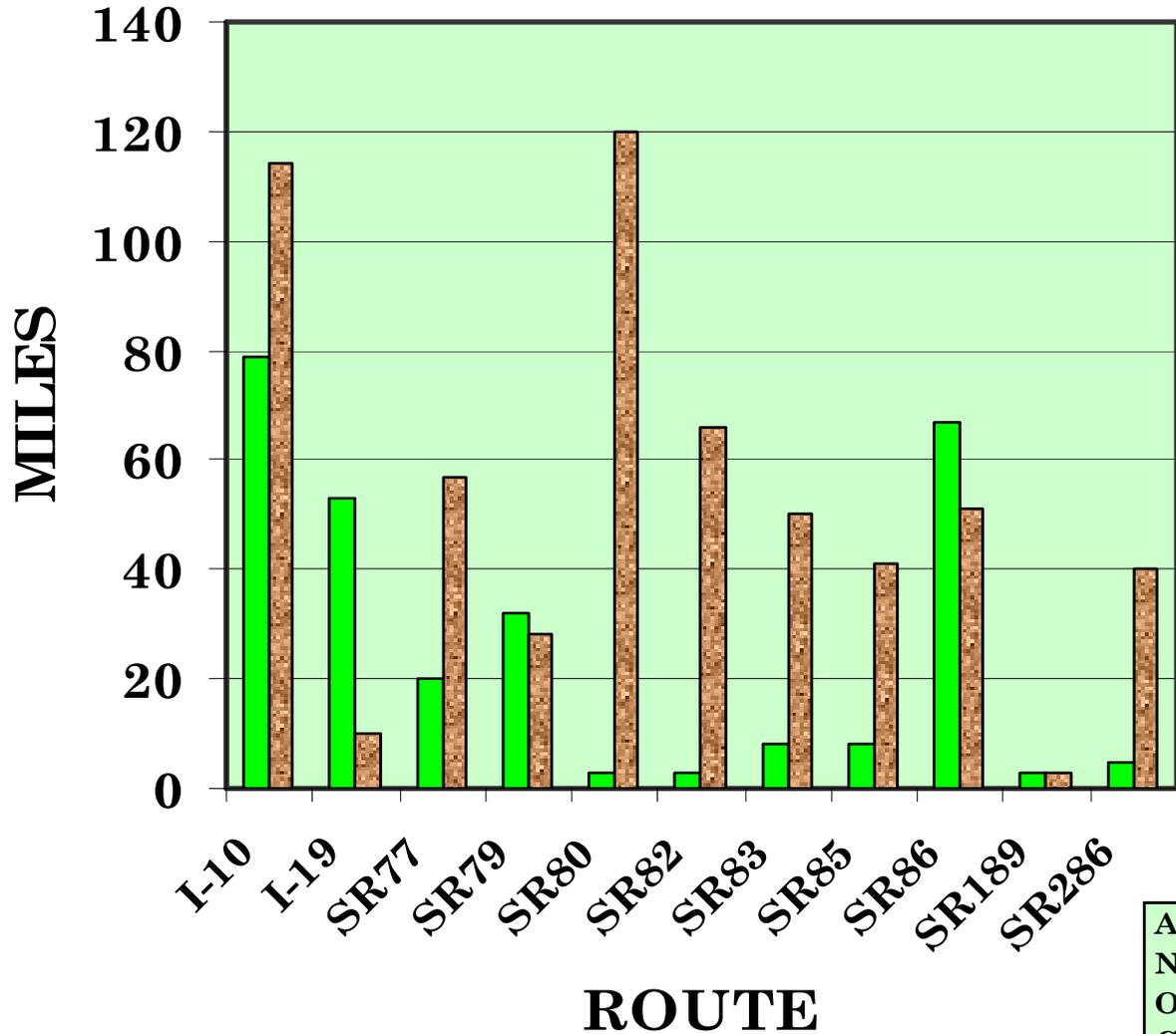


**LEGEND**

- Cities or Towns selection
- Highways or Interstates

Prepared by:  
Arizona Department of Transportation - Offices of Environmental Services, Natural Resources Management Group  
ORG. 9142 Tucson (520) 838-2830      Preparer: Darin Kelly & Sarah Karasz      November 2008  
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# PRESENCE-ABSENCE OF BUFFELGRASS (PER MILE) 2008



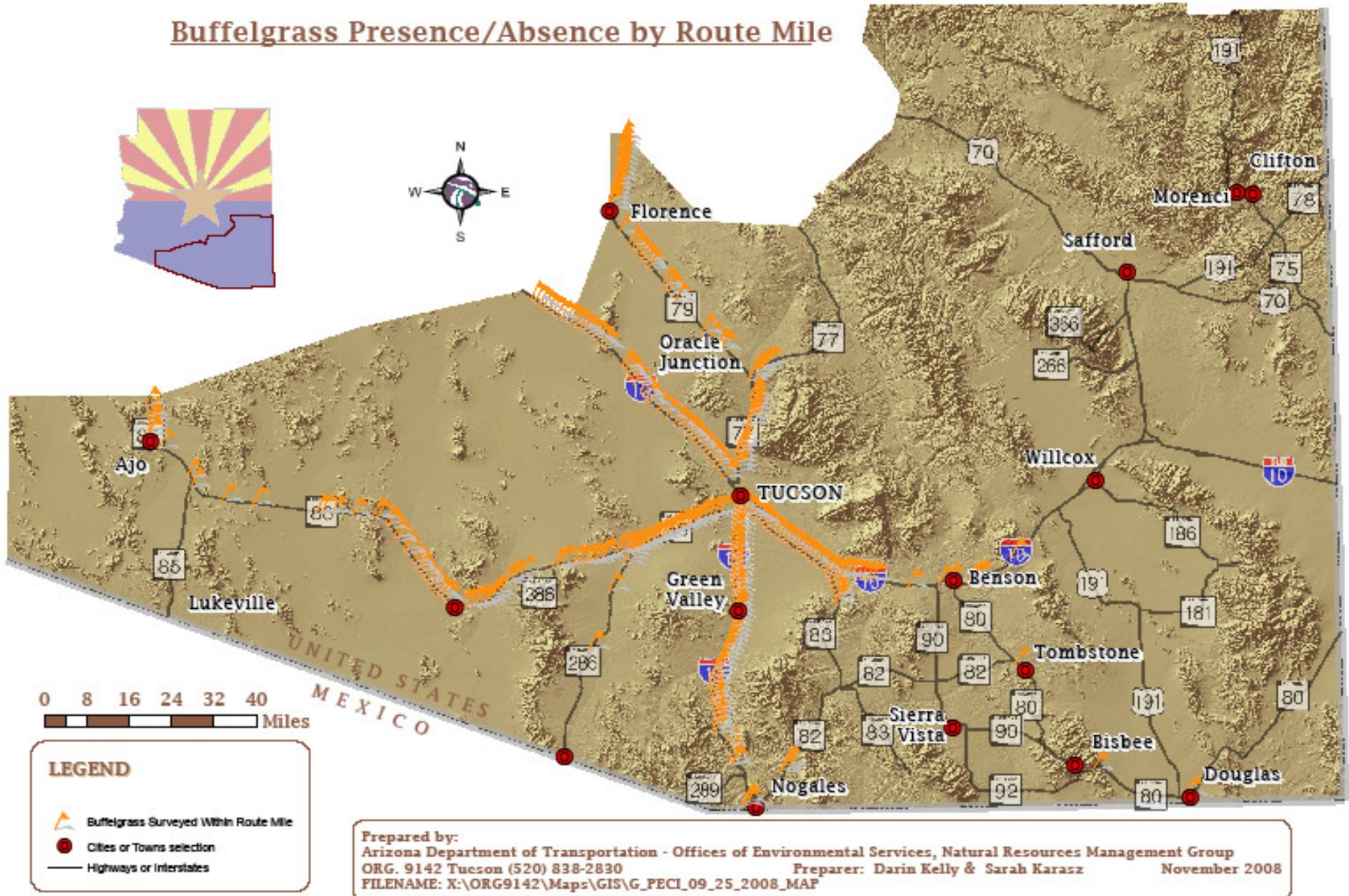
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Org. 9142 Tucson  
Compiled October 2008, Darin Kelly

## Yearly rainfall totals across southeast Arizona since 1993

	Normal	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993
Tucson	12.17	9.78	11.81	9.58	7.62	10.05	7.84	7.81	12.44	9.68	13.62	10.56	10.50	11.18	11.63	14.99
Tucson 17 NW	12.58	16.15	10.67	13.82	9.73	9.29	5.50	10.55	15.58	10.40	13.17	12.32	11.90	7.48	11.18	15.73
Tucson Campbell Ave	12.40	12.30	8.62	11.18	9.26	10.04	8.92	8.57	13.30	12.62	14.07	11.03	10.44	8.27	12.61	15.28
Tucson U of A (NWS)	12.00	11.98	12.07	11.65	8.69	10.44	7.47	8.56	11.53	7.52	16.06	9.15	11.13	9.68	14.55	15.19
Green Valley	15.45	9.41	11.16	11.51	11.78	13.12	10.96	16.23	18.48	13.69	14.54	10.26	10.07	9.59	15.47	22.00
Vail 7N	14.54	14.54	14.98	11.14	10.77	11.23	8.66	13.20	18.20	13.02	19.67	15.24	10.74	m	5.06	
<b>Eastern Pima County</b>	<b>13.54</b>	<b>12.48</b>	<b>11.18</b>	<b>11.57</b>	<b>9.94</b>	<b>10.33</b>	<b>8.46</b>	<b>11.55</b>	<b>15.36</b>	<b>11.27</b>	<b>15.82</b>	<b>11.43</b>	<b>10.50</b>	<b>9.78</b>	<b>13.79</b>	<b>16.76</b>
Sells	13.61	11.44	9.29	10.45	13.80	11.23	8.52	12.53	14.59	7.22	0.25	m	m	m	m	m
<b>Central Pima County</b>	<b>17.38</b>	<b>15.23</b>	<b>12.96</b>	<b>12.22</b>	<b>14.47</b>	<b>17.09</b>	<b>10.06</b>	<b>14.06</b>	<b>17.86</b>	<b>12.60</b>	<b>21.08</b>	<b>14.96</b>	<b>14.86</b>	<b>13.67</b>	<b>17.36</b>	<b>23.83</b>
Oracle 2 SE	24.92	17.12	19.15	15.91	18.64	20.64	10.20	21.22	21.46	19.99	30.91	24.07	21.08	20.22	27.54	34.87
<b>SE Pinal County</b>	<b>14.83</b>	<b>11.15</b>	<b>13.88</b>	<b>11.86</b>	<b>11.02</b>	<b>9.94</b>	<b>5.80</b>	<b>13.42</b>	<b>13.73</b>	<b>10.40</b>	<b>18.29</b>	<b>12.91</b>	<b>12.60</b>	<b>12.59</b>	<b>15.96</b>	<b>22.83</b>
Nogales 6 N	19.03	13.06	14.10	12.60	10.91	16.61	8.06	14.53	25.85	13.02	17.98	14.84	10.79	14.36	20.05	28.22
Tumacacori N.M.	17.40	13.73	18.60	13.39	10.75	12.17	9.85	16.62	19.23	9.92	16.07	19.12	10.83	15.26	26.51	23.42
<b>Santa Cruz County</b>	<b>19.54</b>	<b>18.75</b>	<b>16.91</b>	<b>14.10</b>	<b>14.86</b>	<b>16.71</b>	<b>11.70</b>	<b>18.85</b>	<b>22.60</b>	<b>14.47</b>	<b>18.44</b>	<b>17.27</b>	<b>11.62</b>	<b>14.05</b>	<b>22.67</b>	<b>25.45</b>
Benson 6 SE	14.21	7.06	11.73	8.03	9.41	7.58	6.99	14.02	14.78	14.33	10.94	13.72	6.58	12.59	13.18	17.74
<b>NW Cochise</b>	<b>13.78</b>	<b>11.18</b>	<b>11.18</b>	<b>10.74</b>	<b>13.05</b>	<b>7.50</b>	<b>7.66</b>	<b>12.33</b>	<b>15.43</b>	<b>13.65</b>	<b>11.95</b>	<b>13.72</b>	<b>10.25</b>	<b>12.70</b>	<b>14.81</b>	<b>15.97</b>

# Tucson Natural Resources Management Group

## Buffelgrass Presence/Absence by Route Mile



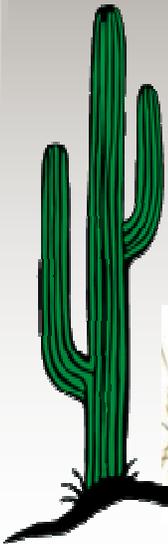
# Management Analysis Timeline

- Year one: satellite endpoint populations intensely surveyed and treated establishing containment boundaries
  - Year Two: endpoints retreated and increased, location survey data improved
  - Year Three: permanent photo documentation and line-intercept monitoring plots established, secondary treatment boundaries established on all routes exiting the Tucson Metro area
- ❖ Accessible road edge stands treated each of the three years



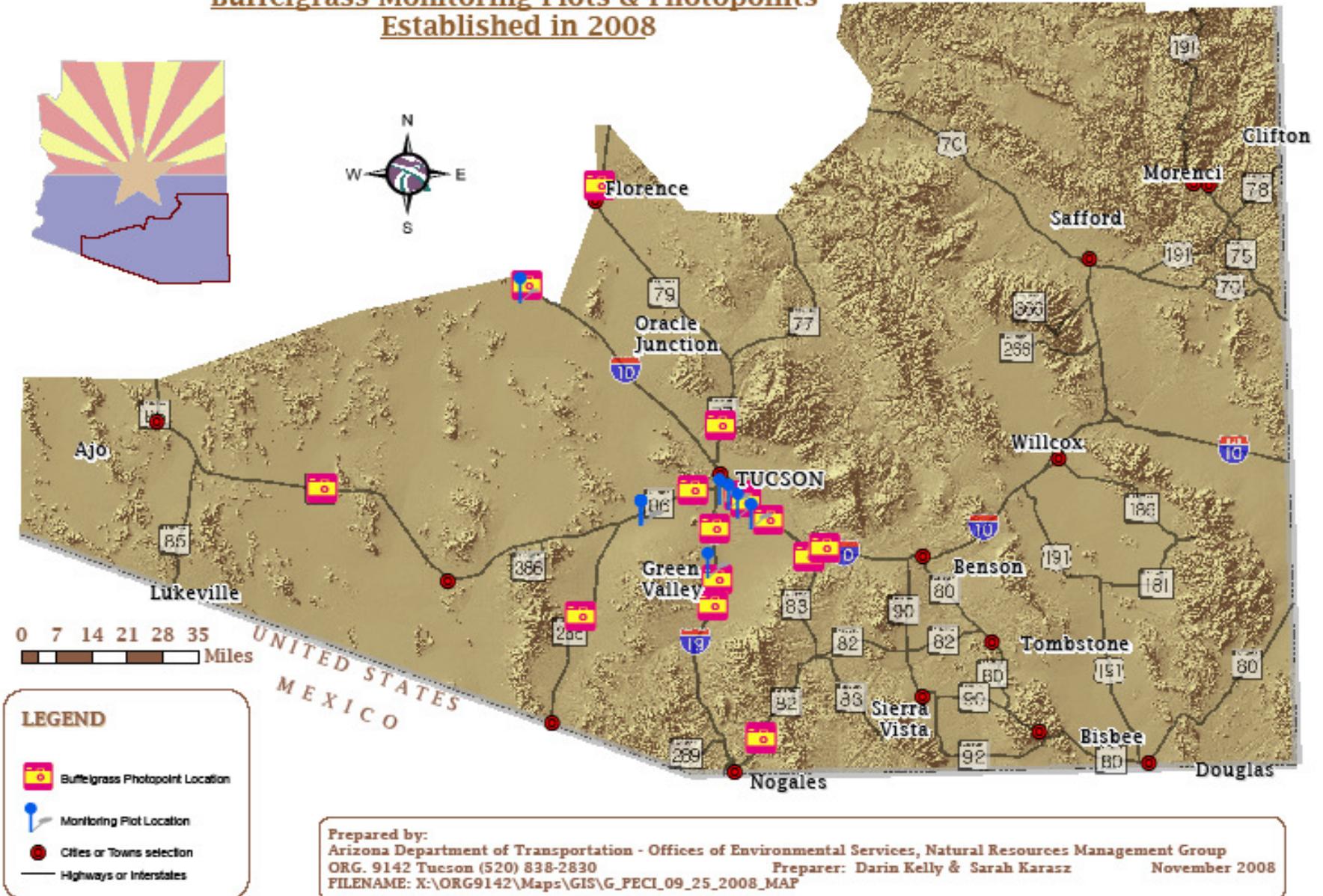
# Three Years of Management

- Improved survey accuracy and methodology
- Permanent monitoring established and ongoing
- Regional treatment strategies
- Application efficacy
- Associated costs
- Acres treated



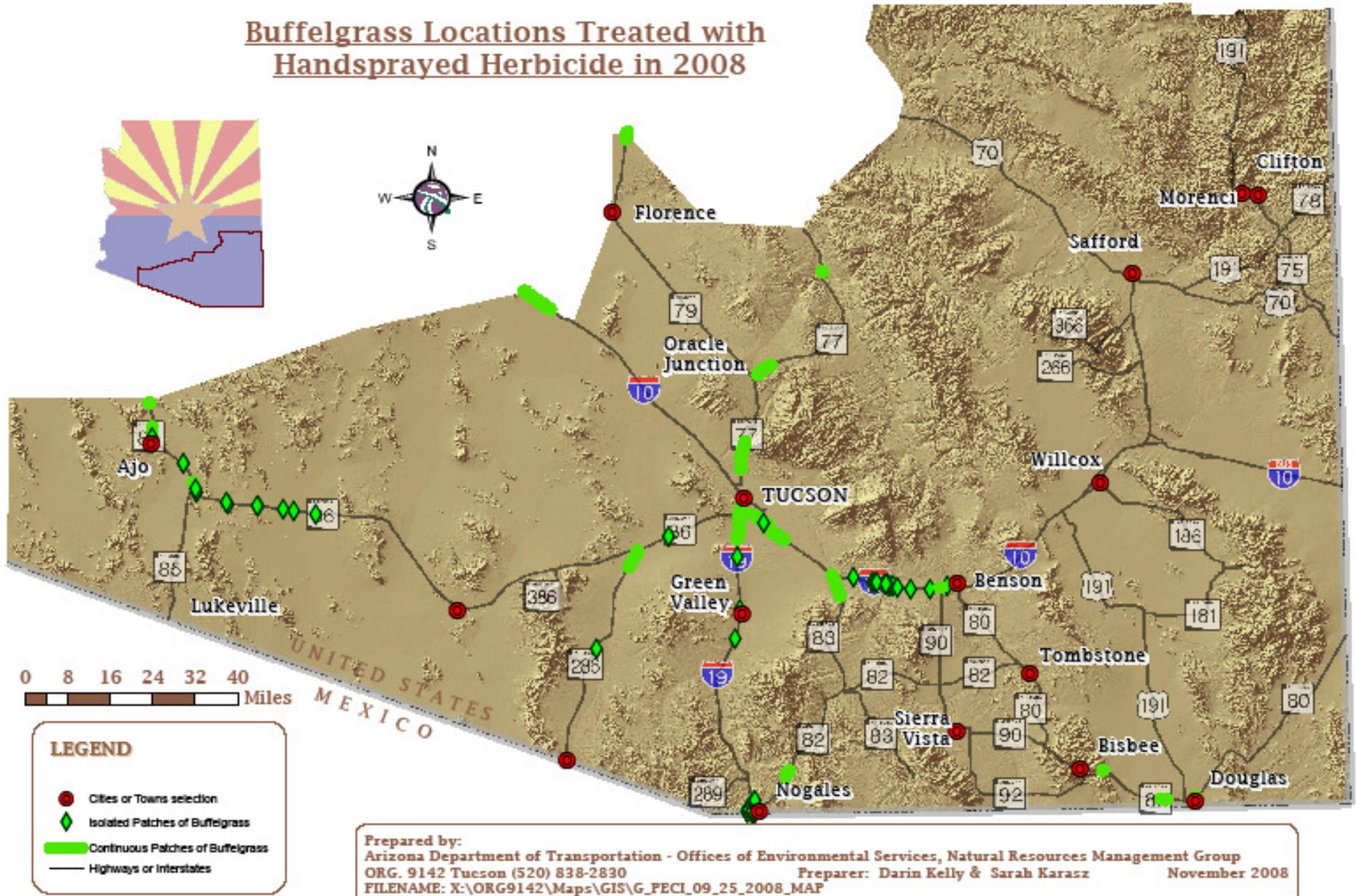
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## Buffelgrass Monitoring Plots & Photopoints Established in 2008



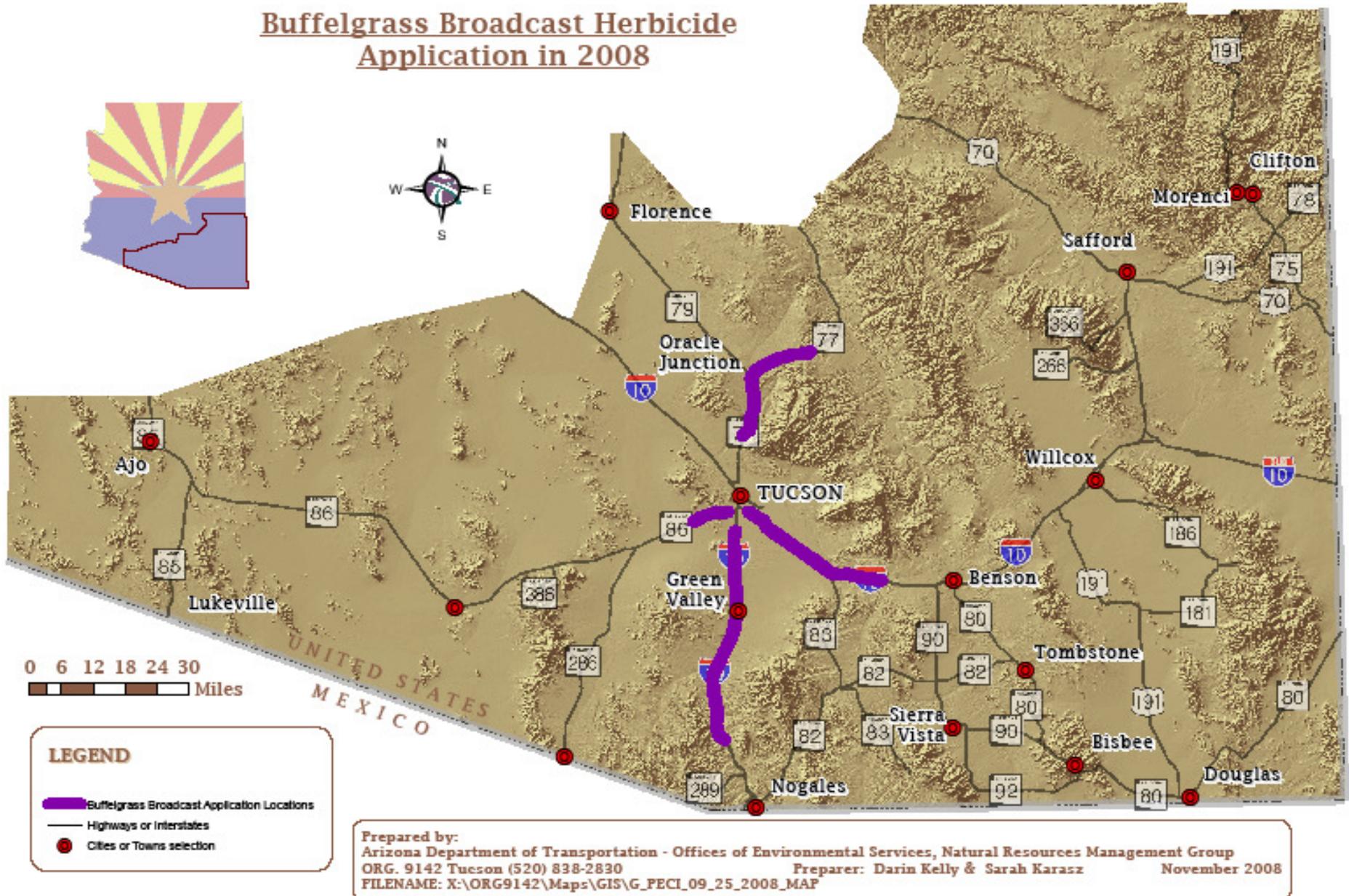
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## Buffelgrass Locations Treated with Handsprayed Herbicide in 2008



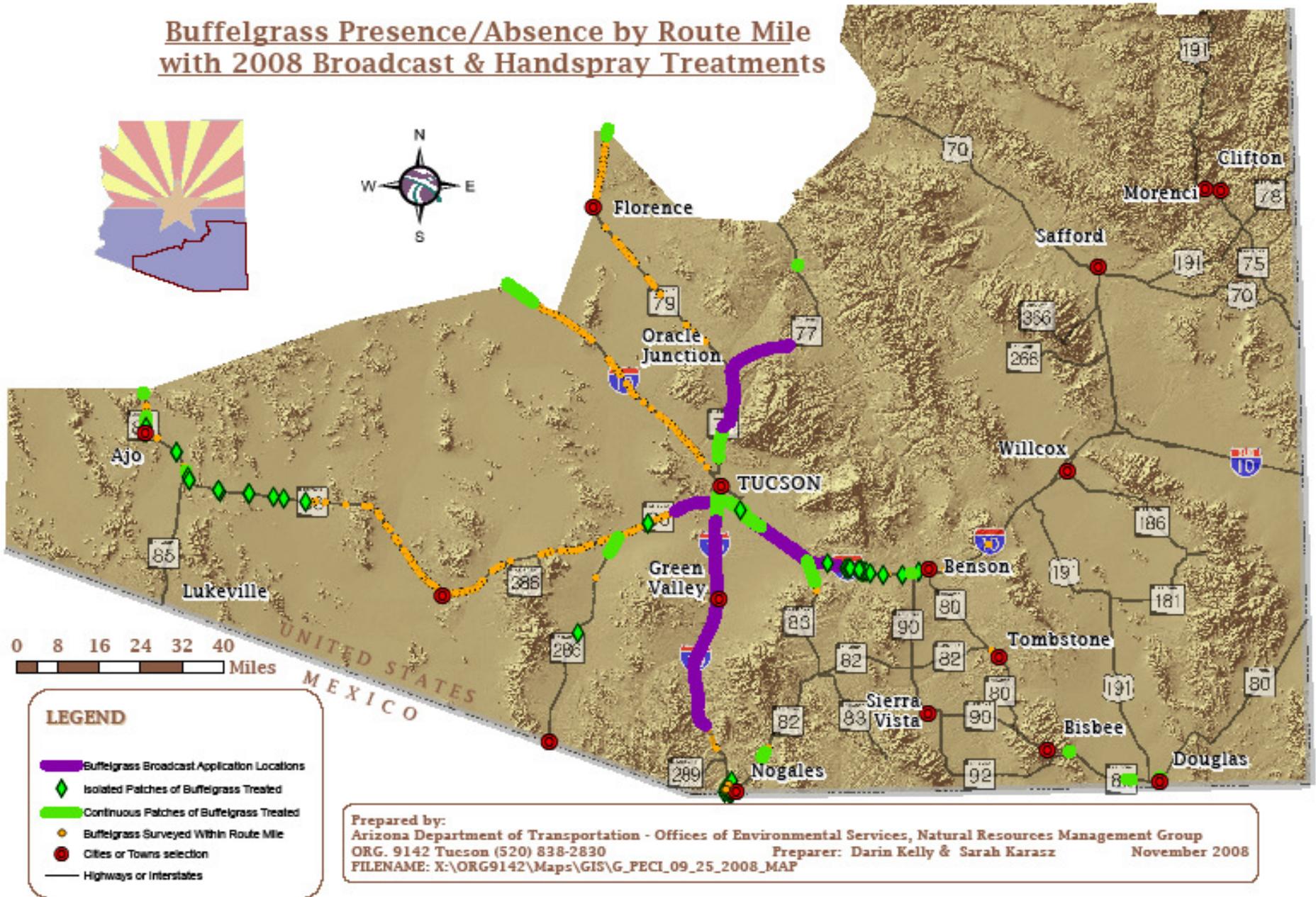
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## Buffelgrass Broadcast Herbicide Application in 2008



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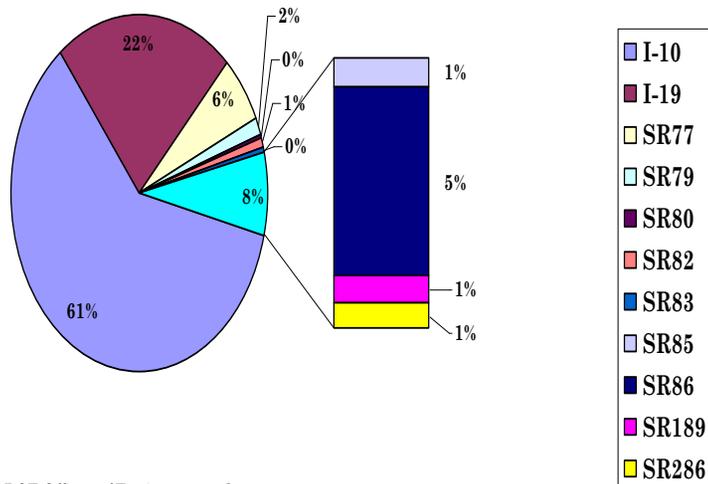
## Buffelgrass Presence/Absence by Route Mile with 2008 Broadcast & Handspray Treatments



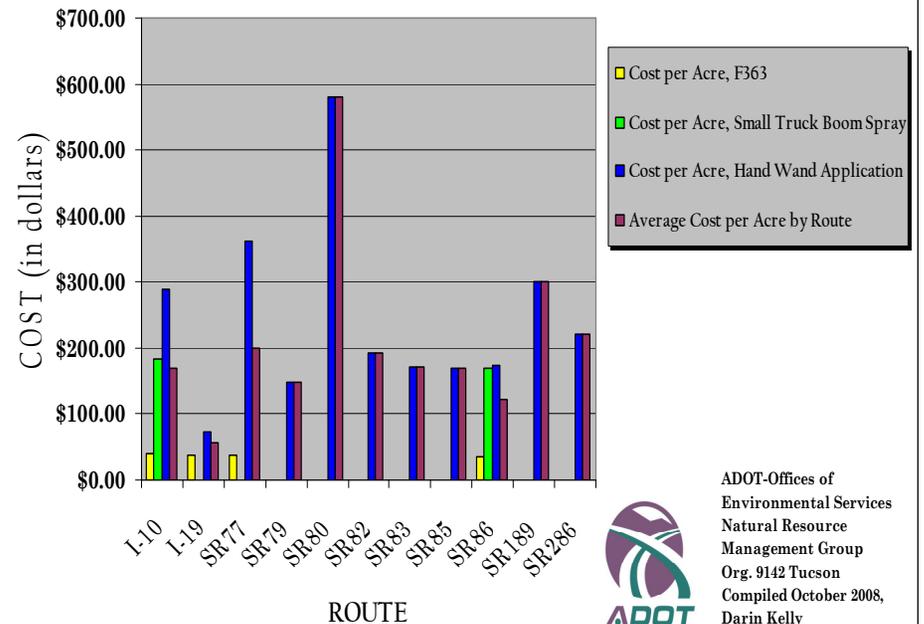
# 2008

	Cost (\$)	# of acres	Total Labor Hours	# of Miles Treated	Average Cost/acre by Activity
LARGE SPRAY TRUCK-F363	\$20,873	542.6	108	110.78	\$37.79
Small Truck Boom Spray	\$11,623	44.25	68	325.76	\$176.07
Hand Wand Application	\$6,722.22	124.27	179.5	475.57	\$243.29
<b>Totals overall</b>	<b>\$39,218.66</b>	<b>711.12</b>	<b>355.5</b>	<b>912.11</b>	

### Total Cost per Route



### Cost Analysis- Buffelgrass Treatment 2008



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# Questions?



Photo by USGS