Instream Assessment

- Evaluate the magnitude, frequencies, and durations of flows at the selected locations.
- Consider quantitative ecological ramifications in the forms of relative differences in species abundance, suitable habitat area, and/or other factors.

Instream Flow Components (TIFP)

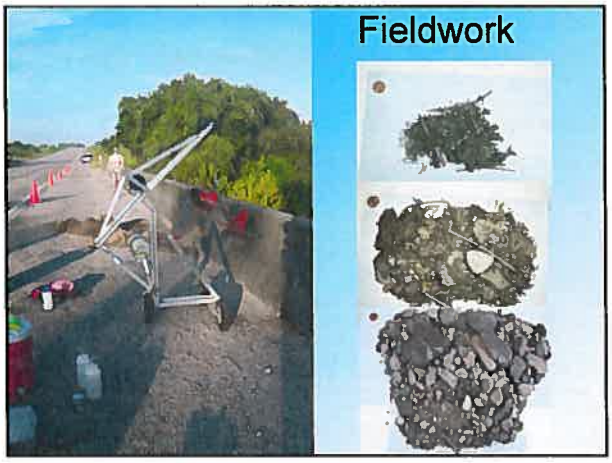
Subsistence flows	
Definition:	Infrequent, seasonal periods of low flow
Objectives:	Maintain water quality criteria
Base flows	
Definition:	Normal flow conditions between storm events
Objectives:	Ensure adequate habitat conditions, including variability, to support the natural biological community
High flow pulses	
Definition:	Short-duration, in-channel, high flow events following storm events
Objectives:	Maintain important physical habitat features Provide longitudinal connectivity along the river channel
Overbank flows	
Definition:	Infrequent, high flow events that exceed the normal channel
Objectives:	Maintain riparian areas Provide lateral connectivity between the river channel and active floodplain

Lower San Antonio River - Goliad Project

Fieldwork

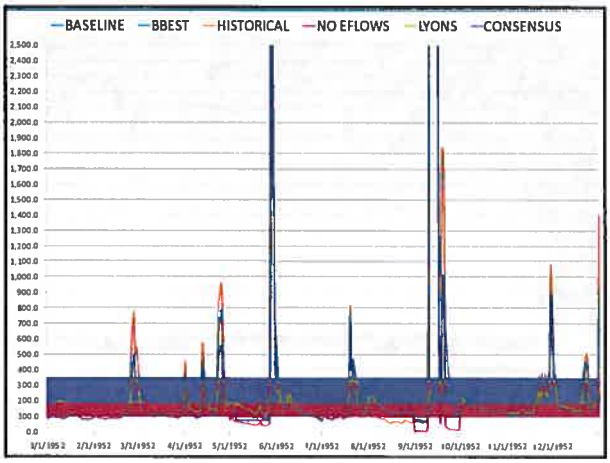
Fieldwork
Photo: Clint Robertson (TPWD)

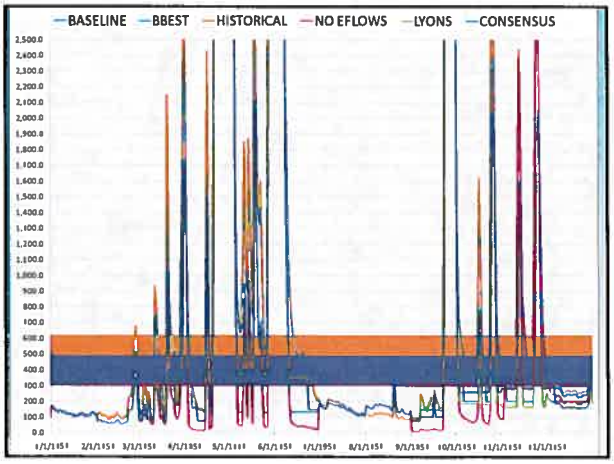
Fieldwork

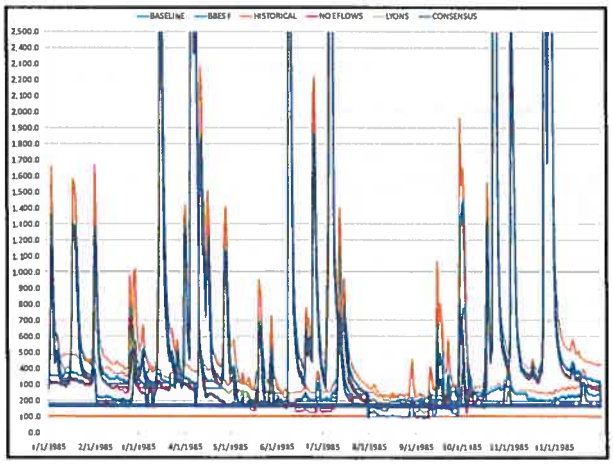

Fieldwork

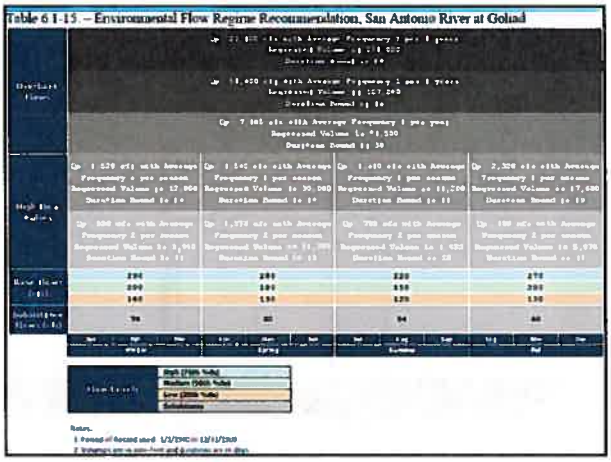
Goliad Evaluation

- Water Quality
  - Subsistence flow – focus on dissolved oxygen and temperature
- Habitat Availability
  - Subsistence and base flows – fish habitat
- Flow Pulses
  - Riparian communities
- Total Annual Volume
  - Riparian growth and sediment transport



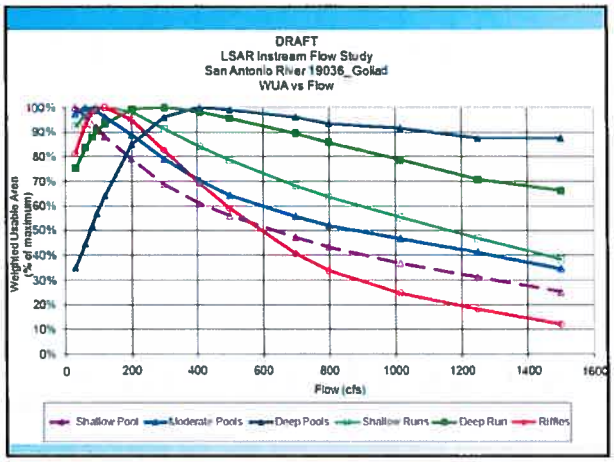






Goliad Tools for Evaluation

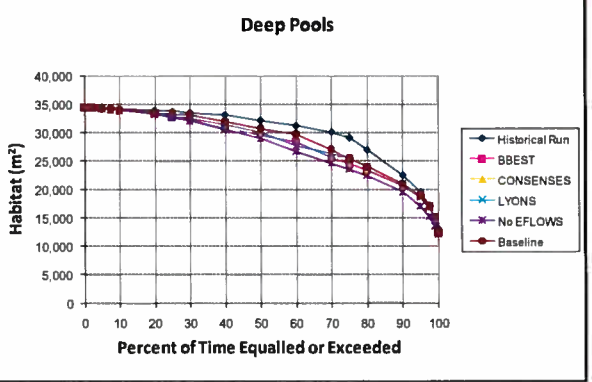
- Water Quality
  - Existing Data
  - Water quality model for the lower San Antonio River – Texas Instream Flow Program (TIFP) / SARA
- Aquatic Habitat
  - TIFP/SARA 2D hydraulic and habitat models
- Pulses and Total Annual Volume
  - Hydrology



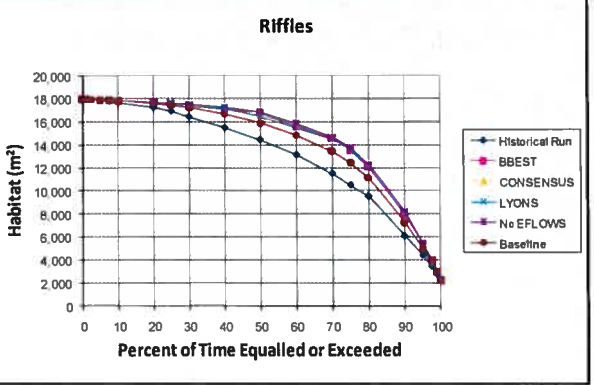
Habitat Time Series - BBEST

Percent of Maximum Available Habitat						
Percent Exceedance Level	Moderate Pools	Deep Pools	Deep Run	Shallow Pool	Shallow Runs	Riffles
0.01	100%	100%	100%	100%	100%	100%
0.1	100%	100%	100%	100%	100%	100%
1	100%	100%	100%	81%	100%	100%
2.5	98%	100%	100%	95%	100%	100%
5	99%	99%	100%	93%	100%	100%
7.5	99%	99%	100%	92%	100%	99%
10	98%	98%	100%	81%	100%	99%
20	95%	97%	100%	87%	99%	98%
25	94%	95%	98%	85%	99%	98%
30	83%	94%	99%	84%	99%	97%
40	90%	90%	98%	81%	94%	95%
50	88%	88%	97%	79%	87%	93%
60	83%	82%	95%	73%	94%	87%
70	78%	74%	98%	68%	87%	81%
75	74%	71%	93%	65%	87%	75%
80	69%	68%	91%	60%	83%	97%
90	58%	60%	87%	49%	70%	44%
95	50%	54%	81%	41%	60%	30%
97.5	45%	49%	78%	35%	52%	22%
99	39%	44%	70%	30%	45%	16%
99.9	35%	37%	87%	26%	39%	13%
99.99	35%	36%	88%	25%	39%	12%

Habitat Duration Curves



Habitat Duration Curves



Habitat Duration Curves – BBEST Monthly

Flow Pulses

- BBEST Recommendations
  - HEFR default values
- TIFP Recommendations
  - Indicator species – ecological linkage to flow
  - Black willow (April – June)
  - Buttonbush (September – October)
  - Boxelder (August – October; recruit through the following spring)
  - Cottonwood (May – July)
  - Green ash (September – October; recruit for several years)
  - Sycamore (February – May; good seed crops only every 1 or 2 years)
  - Hardwood forest communities' growing season (February – October)

Total Annual Volume (acre-feet)

- Riparian growth (TIFP)
- Sediment Transport (BBEST)

	Goliad		
	Baseline	BBEST	Historical
min	95,114	93,387	88,990
25th	212,162	180,914	269,041
median	364,144	329,577	411,304
75th	694,860	612,661	764,220
max	1,448,998	1,423,088	1,636,074
	Difference		
	BASE/His	BBEST/Base	BBEST/His
min	-7%	2%	-5%
25th	21%	15%	33%
median	11%	9%	20%
75th	9%	12%	20%
max	11%	2%	13%

Goliad Preliminary Conclusions of BBEST recommendations

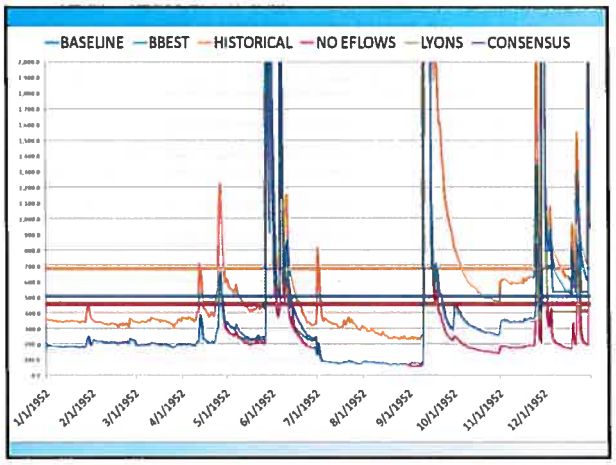
- **Water Quality**
  - Existing water quality data supportive
  - Modeling of water temperature shows stress at subsistence flows during extreme summertime conditions
- **Aquatic Habitat**
  - Supported by BBEST recommendations
  - Continued base flow evaluation for balancing possible.

Goliad Preliminary Conclusions of BBEST recommendations

- **Pulses and Total Annual Volume**
  - Riparian (TIFP) supported
  - Sediment transport may not be supported if 10% change in annual sediment yield is considered part of the BBEST recommendation. Not a TIFP concern for the lower San Antonio River

Questions

Guadalupe River - Gonzales Project


BASELINE
BBEST
HISTORICAL
NO EFLOWS
LYONS
CONSENSUS
1/1/1952
2/1/1952
3/1/1952
4/1/1952
5/1/1952
6/1/1952
7/1/1952
8/1/1952
9/1/1952
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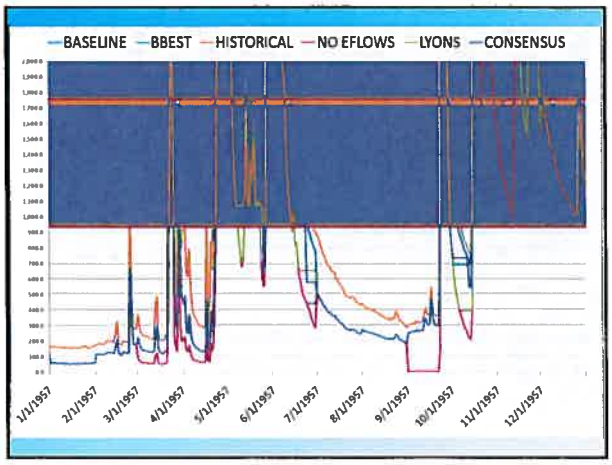
11/1/1952
12/1/1952


BASELINE
BBEST
HISTORICAL
NO EFLOWS
LYONS
CONSENSUS
1/1/1957
2/1/1957
3/1/1957
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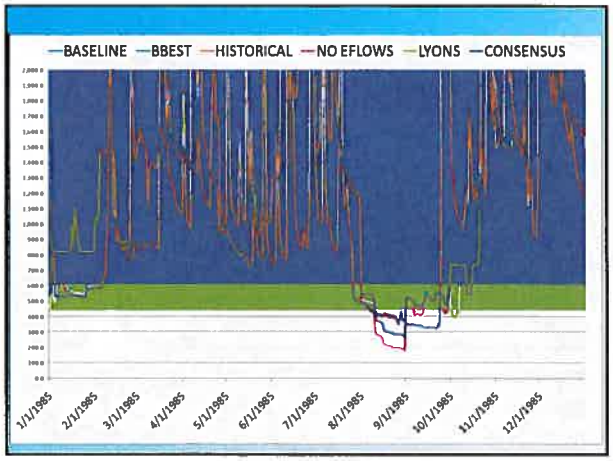


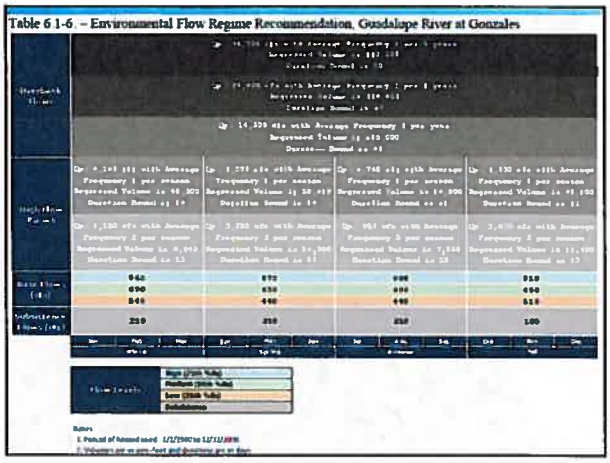


Table 6.1-6. – Environmental Flow Regime Recommendation, Guadalupe River at Gonzales

Gonzales Tools for Evaluation

- Water Quality
  - Existing Data
- Aquatic Habitat
  - TIFP PHABSIM analysis (hydraulic and habitat models)
- Pulses and Total Annual Volume
  - Hydrology

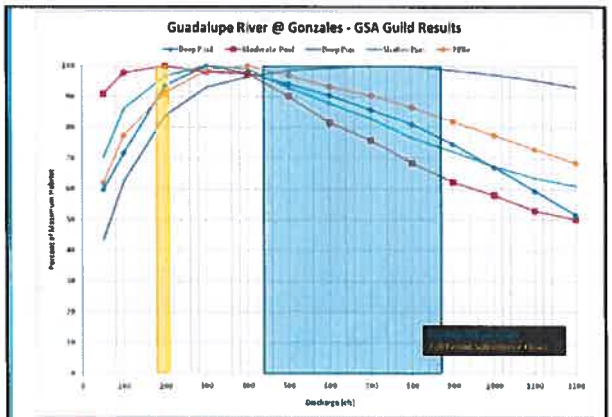
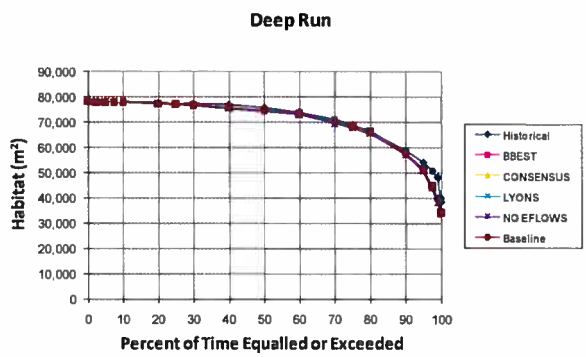


Figure 3.3-15 Percent of maximum habitat versus discharge for habitat guilds at Guadalupe River at Gonzales

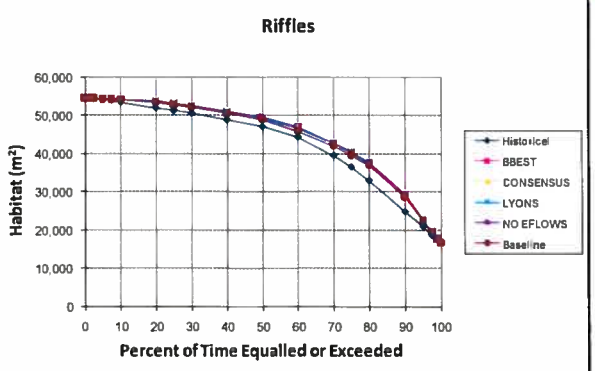
Habitat Time Series - BBEST

Percent of Maximum Available Habitat					
Percent Exceedence Level	Deep Pool	Deep Run	Shallow Pool	Shallow Runs	Riffles
0.01	100%	100%	100%	100%	100%
0.1	100%	100%	100%	100%	100%
1	100%	100%	100%	100%	100%
2.5	100%	100%	100%	100%	100%
5	99%	100%	99%	100%	100%
7.5	99%	100%	99%	99%	99%
10	98%	100%	99%	99%	99%
20	98%	99%	98%	98%	98%
25	95%	99%	98%	97%	97%
30	94%	99%	95%	95%	96%
40	81%	97%	90%	91%	93%
50	67%	96%	80%	85%	91%
60	61%	94%	74%	80%	86%
70	70%	90%	62%	72%	79%
75	64%	88%	57%	67%	74%
80	55%	85%	51%	62%	69%
90	28%	74%	41%	50%	53%
95	18%	66%	37%	41%	42%
97.5	16%	57%	31%	35%	36%
99	16%	51%	28%	32%	33%
99.9	15%	44%	28%	30%	31%
99.99	15%	43%	28%	30%	30%

Habitat Duration Curves



Habitat Duration Curves



Total Annual Volume (acre-feet)

- Sediment Transport (BBEST)

Gonzales T1		
Baseline	BBEST	Historical
42,854	42,835	108,723
398,558	386,293	545,396
765,604	743,999	923,220
1,140,478	1,116,898	1,269,547
2,282,683	2,265,432	2,529,590
Difference		
BASE/His	BBEST/Base	BBEST/His
61%	0%	61%
27%	3%	29%
17%	3%	19%
10%	2%	12%
10%	1%	10%

Gonzales Preliminary Conclusions of BBEST recommendations

- **Water Quality**
  - Existing water quality data supportive
- **Aquatic Habitat**
  - Supported by BBEST recommendations
  - Considerable room for further evaluation at base flows.
- **Pulses and Total Annual Volume**
  - BBEST HEFR default pulses met
  - Sediment transport may not be supported if 10% change in annual sediment yield is considered part of the BBEST recommendation.