*Meeting of the*

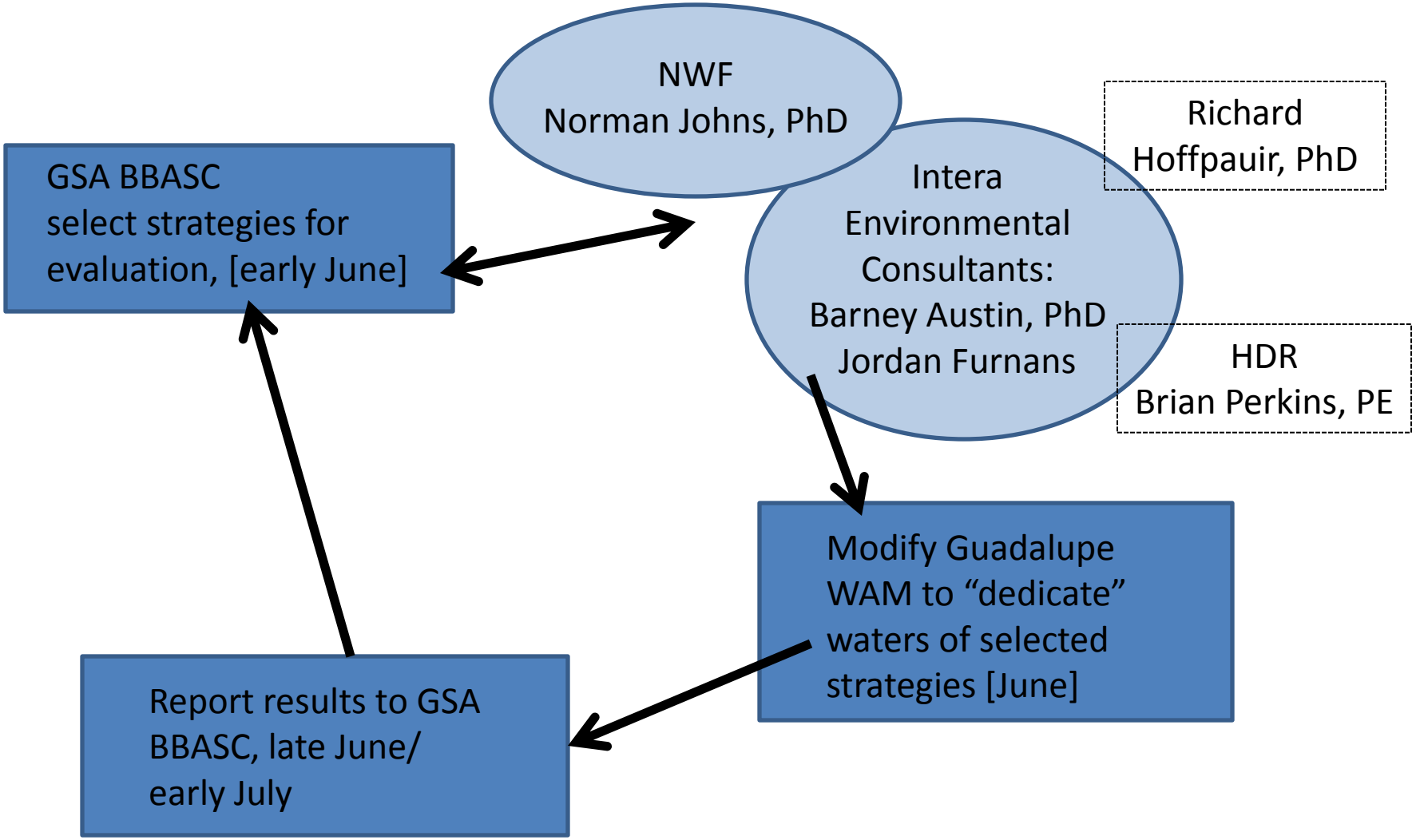
**Guadalupe, San Antonio, Mission, and Aransas Rivers and Mission, Copano, Aransas, and San Antonio Bays Basin and Bay Area Stakeholder Committee (BBASC)**

# Report on Evaluations of "Strategies" To Meet Environmental Flow Standards

**July 6, 2011**

NATIONAL WILDLIFE FEDERATION

INTERA Geosciences & Engineering


NWF
Norman Johns, PhD
Richard
Hoffpauir, PhD
GSA BBASC
select strategies for
evaluation, [early June]
Intera
Environmental
Consultants:
Barney Austin, PhD
Jordan Furnans
HDR
Brian Perkins, PE
Modify Guadalupe
WAM to "dedicate"
waters of selected
strategies [June]
Report results to GSA
BBASC, late June/
early July

# Summary – Attainment of G2 Summer Criteria (oysters)

## with the Guadalupe River Project

**Previously presented by BBEST**

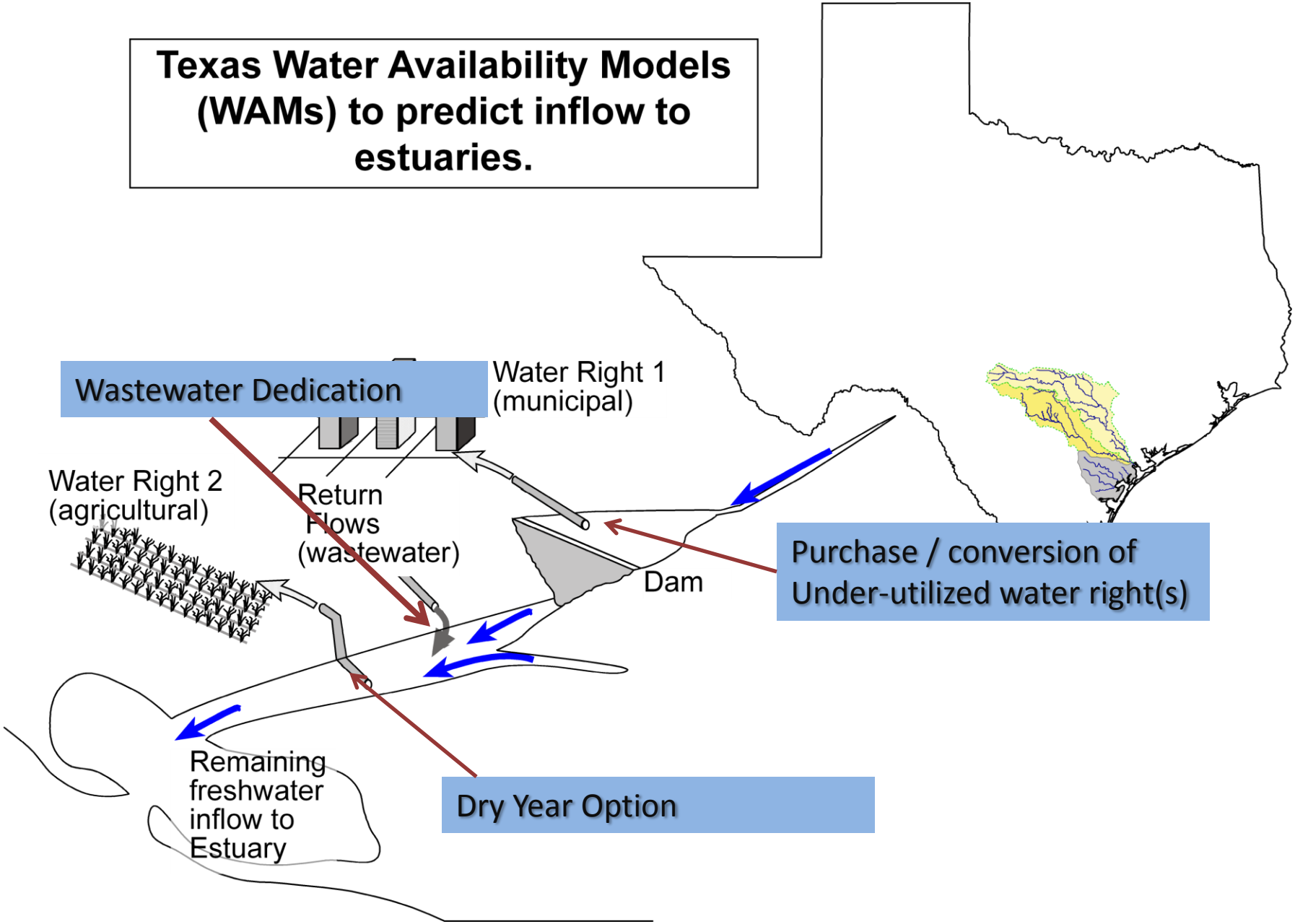
| **Counts** | Criteria G2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Scenario | >A-pr | A-pr | A | B | C | CC | D | DD | sum |
| Historical | 8 | 11 | 11 | 8 | 5 | 1 | 1 | 4 | 49 |
| Present | 5 | 11 | 8 | 10 | 8 | 1 | 1 | 5 | 49 |
| Region L Baseline; BBASC | 4 | 8 | 8 | 8 | 7 | 3 | 3 | 8 | 49 |
| w. Guadalupe Project | 4 | 8 | 8 | 8 | 7 | 3 | 3 | 8 | 49 |
| TCEQ Baseline; (Run 3) | 4 | 6 | 9 | 8 | 6 | 4 | 3 | 9 | 49 |

| Color coding convention |
|---|
| -OK, met criteria |
| -Near miss. (rounding; p-o-record) |
| -Not met, but departure not great |
| -Very bad |

| see Tables 4.5-2; 4.5-4 | | >12% | >17% | | | | <=6% | |
|---|---|---|---|---|---|---|---|---|
| **Attain. - Singles** | Single G2 criteria attainment (% of yrs.) | | | | | | | |
| Scenario | >A-pr | A-pr | A | B | C | CC | D | DD |
| Historical | | 22.4% | 22.4% | 16.3% | 10.2% | 2.0% | 2.0% | 8.2% |
| Present | | 22.4% | 16.3% | 20.4% | 16.3% | 2.0% | 2.0% | 10.2% |
| Region L Baseline; BBASC | | 16.3% | 16.3% | 16.3% | 14.3% | 6.1% | 6.1% | 16.3% |
| w. Guadalupe Project | | 16.3% | 16.3% | 16.3% | 14.3% | 6.1% | 6.1% | 16.3% |
| TCEQ Baseline; (Run 3) | | 12.2% | 18.4% | 16.3% | 12.2% | 8.2% | 6.1% | 18.4% |

| see Table 4.5-2 | | | >=30% | | >10% | <=1/6 | <=9% | |
|---|---|---|---|---|---|---|---|---|
| **Attain. - Joints** | Joint G2 criteria attainment (% of yrs. and fractions) | | | | | | | |
| Scenario | >A-pr | | A & B | | C & CC | frac. CC | D & DD | |
| Historical | | | 38.8% | | 12.2% | 16.7% | 10.2% | |
| Present | | | 36.7% | | 18.4% | 11.1% | 12.2% | |
| Region L Baseline; BBASC | | | 32.7% | | 20.4% | 30.0% | 22.4% | |
| w. Guadalupe Project | | | 32.7% | | 20.4% | 30.0% | 22.4% | |
| TCEQ Baseline; (Run 3) | | | 34.7% | | 20.4% | 40.0% | 24.5% | |

# Texas Water Availability Models (WAMs) to predict inflow to estuaries.



Strategies Evaluated

#1 Wastewater Dedication [up to 10]

1a – 60,000 ac-ft/yr

1b – 120,000 ac-ft/yr

#2 Dry Year Option [up to 5]

2a – 16,000 ac-ft/yr

2b – 32,000 ac-ft/yr

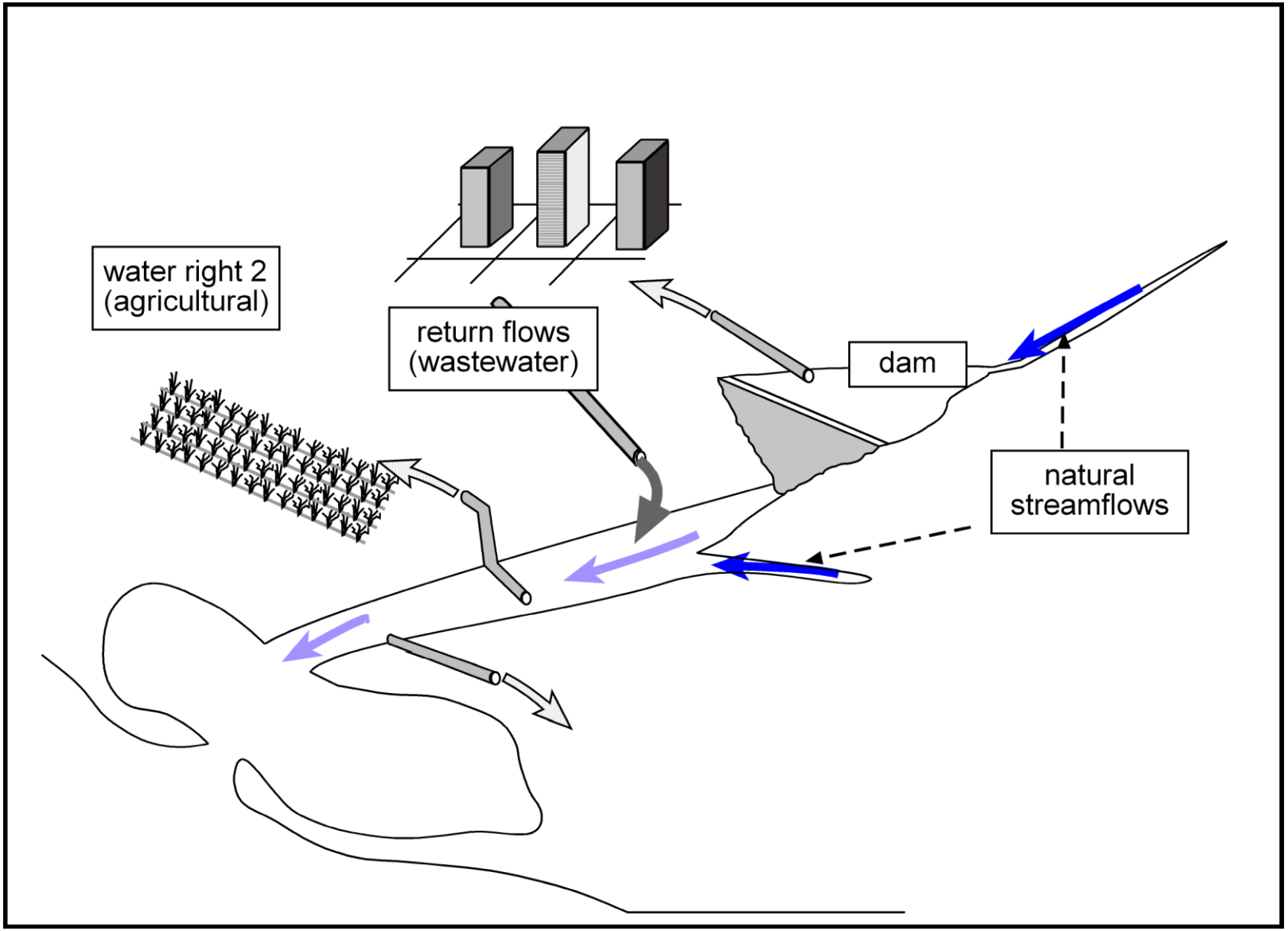
#3 Conversion of Under-utilized Water Rights [up to 5]

3a – 48,000 ac-ft/yr

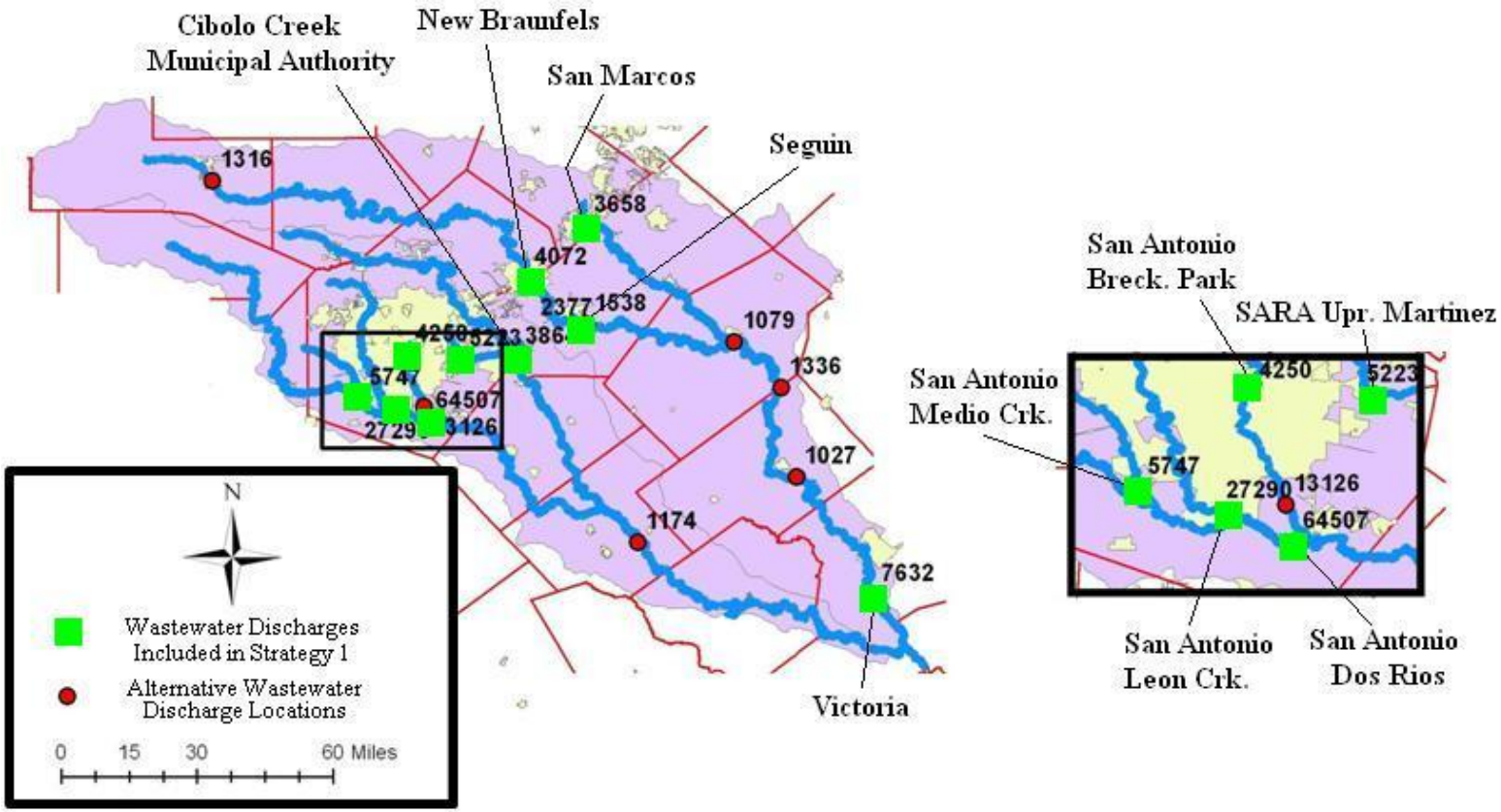
3b – 96,000 ac-ft/yr

#4 Combination Strategy

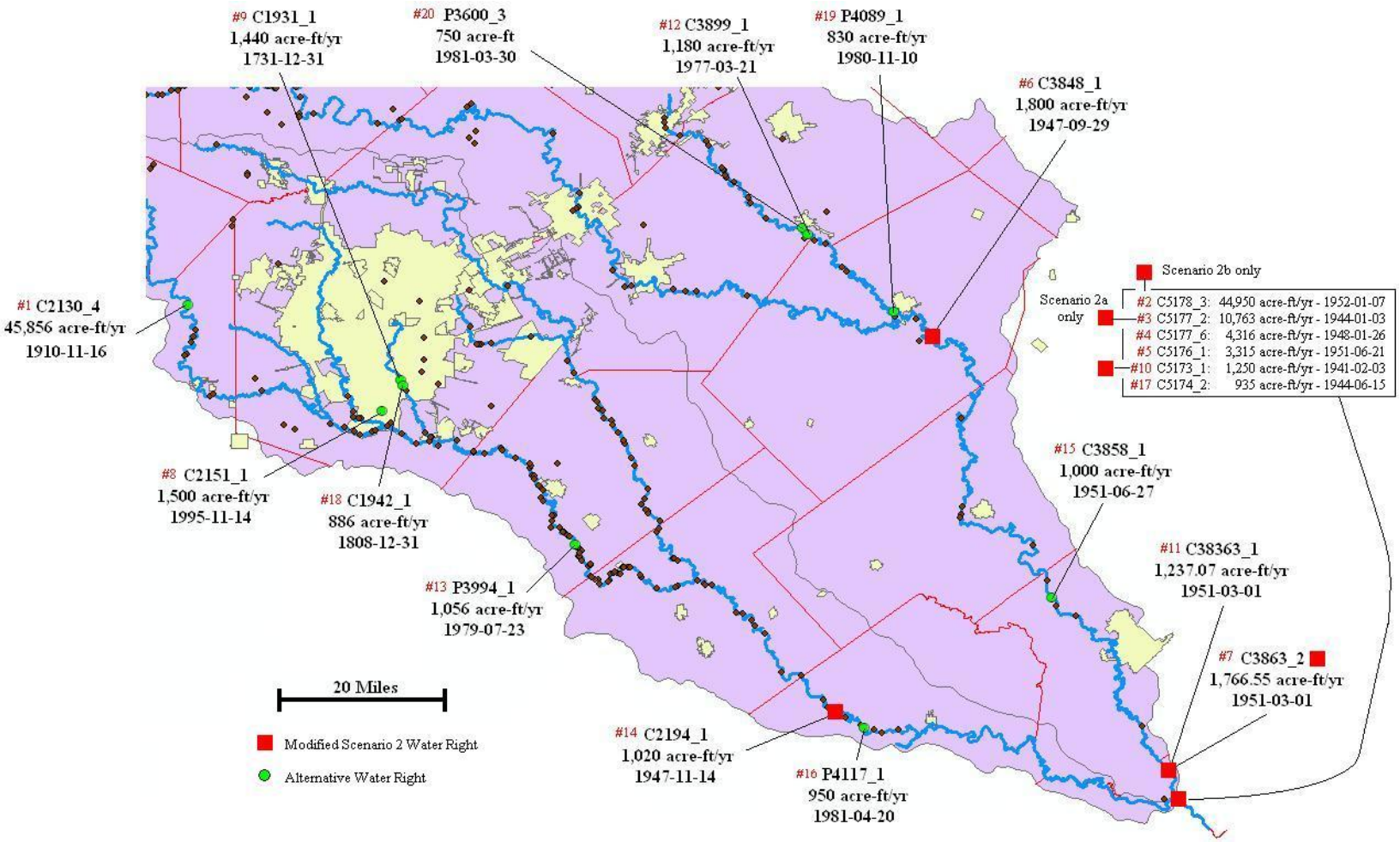
1a & 2a & 3a simultaneously


water right 2
(agricultural)
return flows
(wastewater)
dam
natural
streamflows

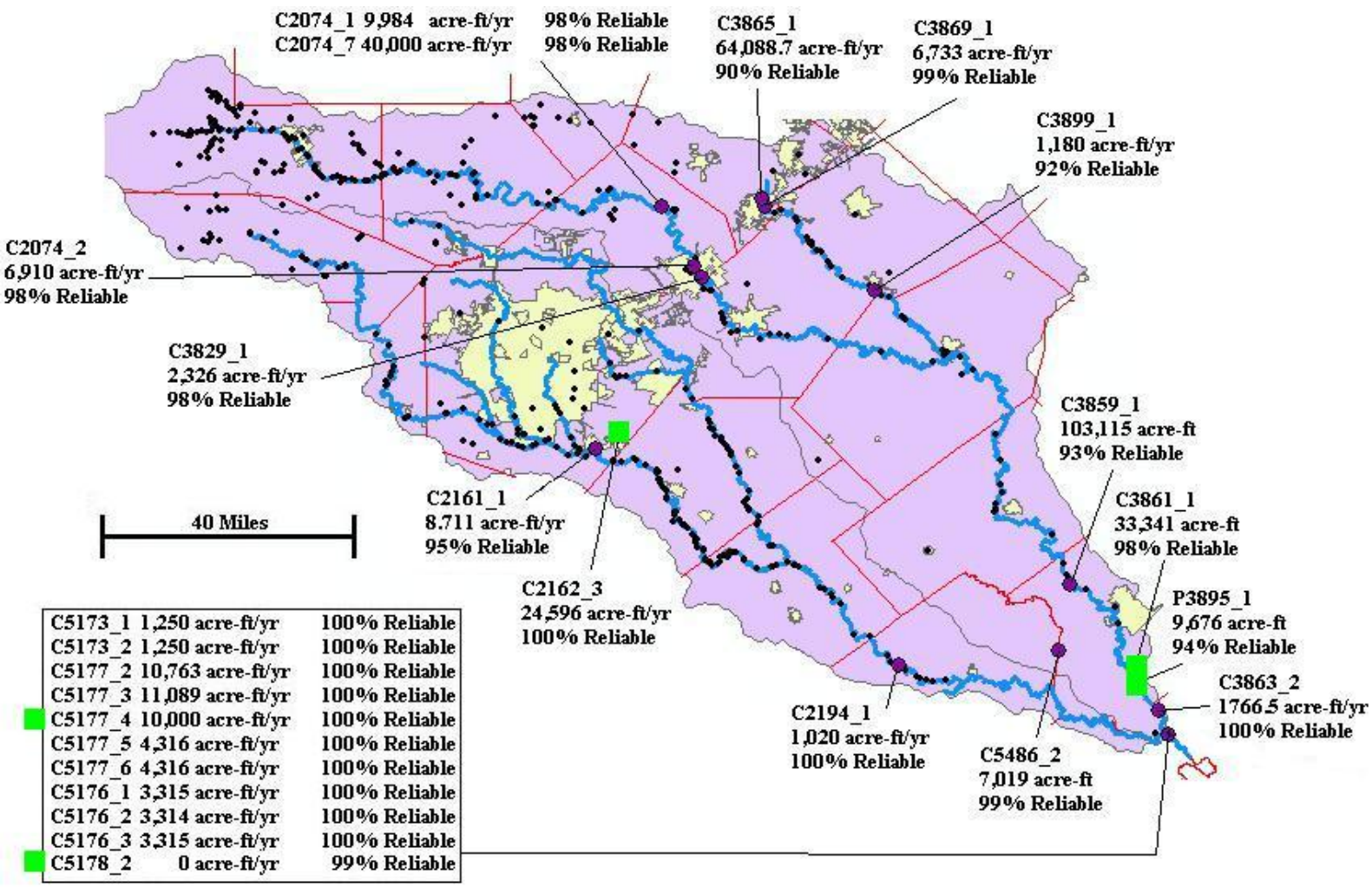
# Strategy #1 Wastewater Dedication – selected discharges

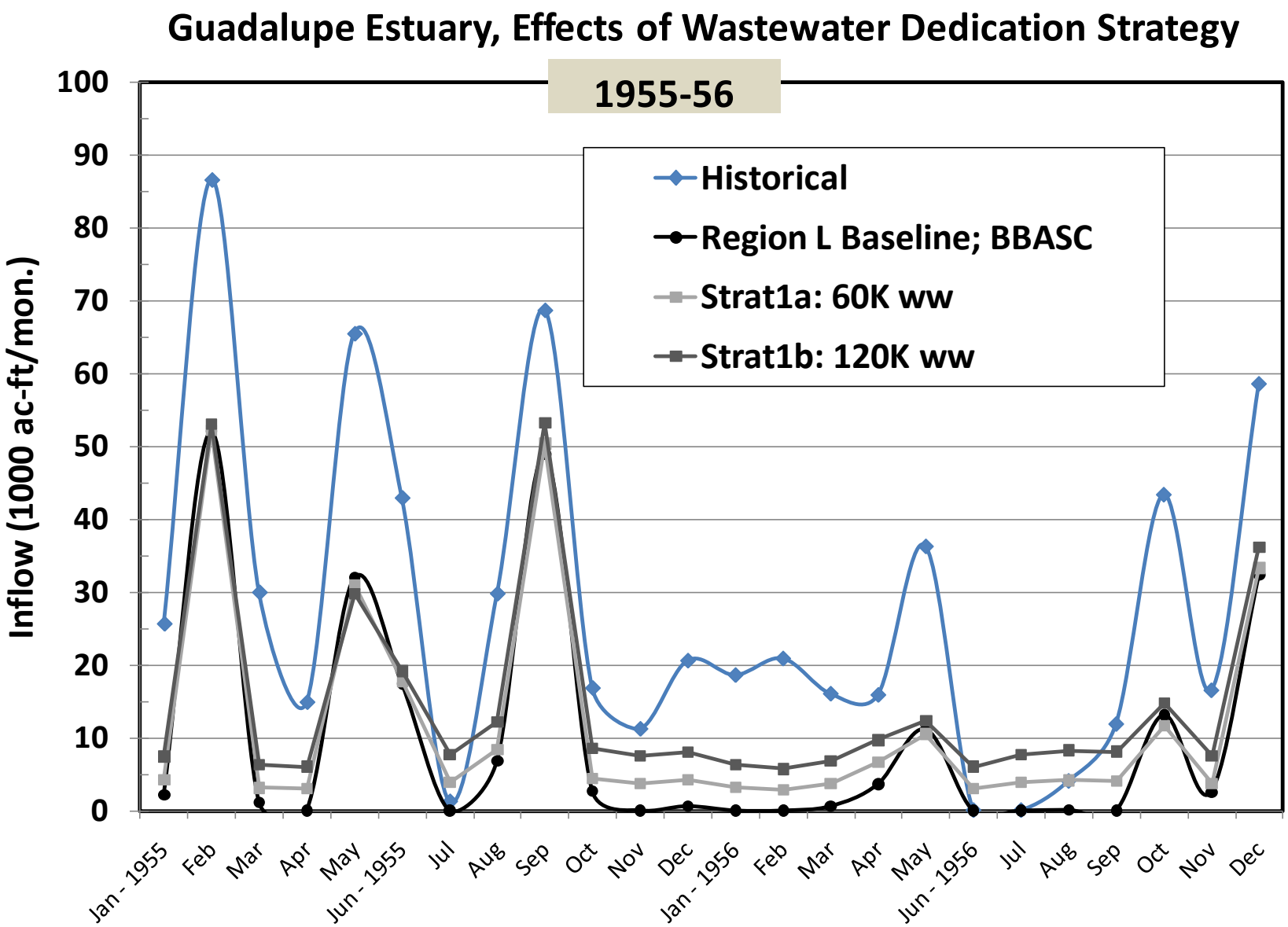


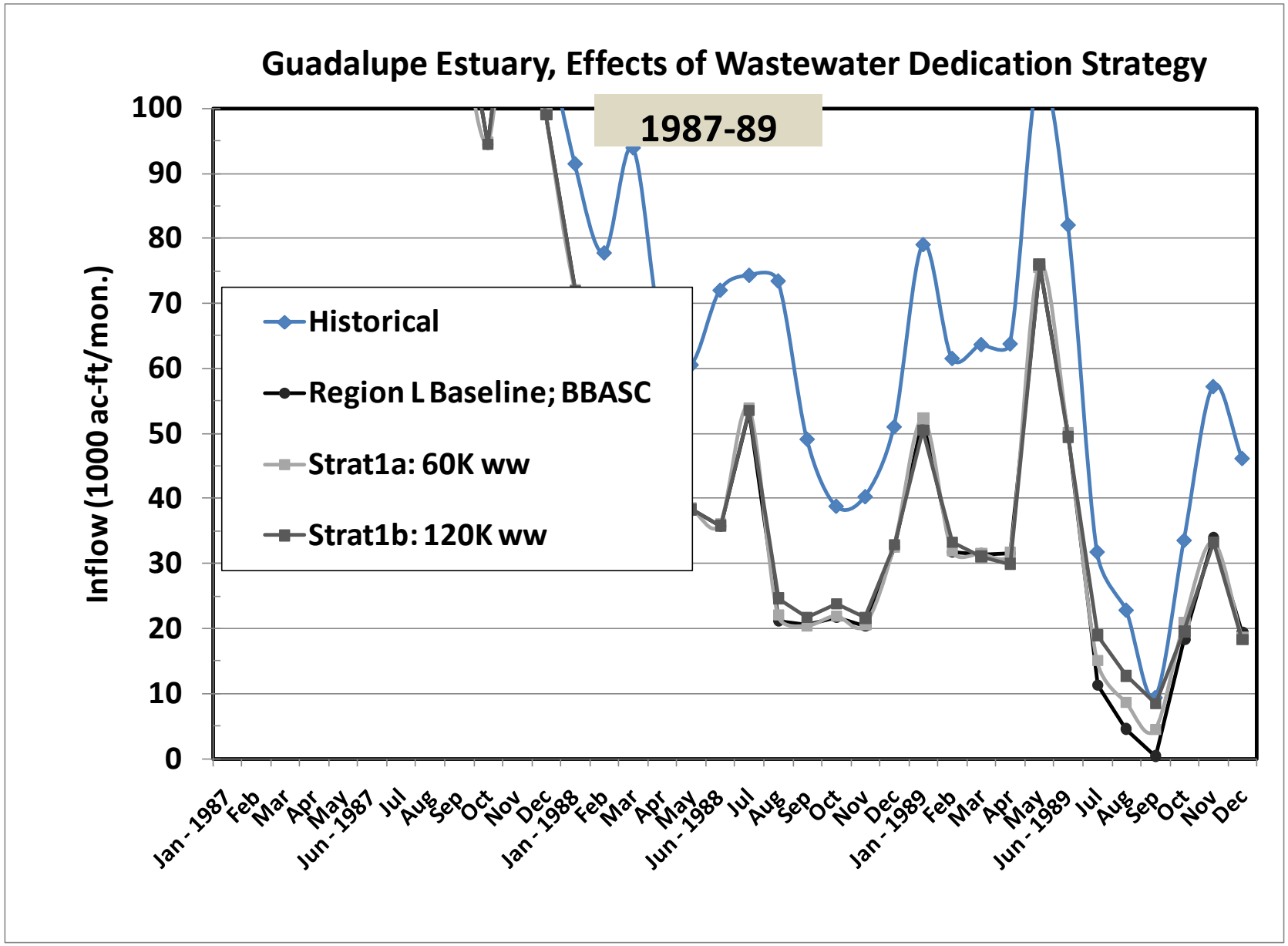
# Strategy #2 Dry Year Option – selected irrigation rights

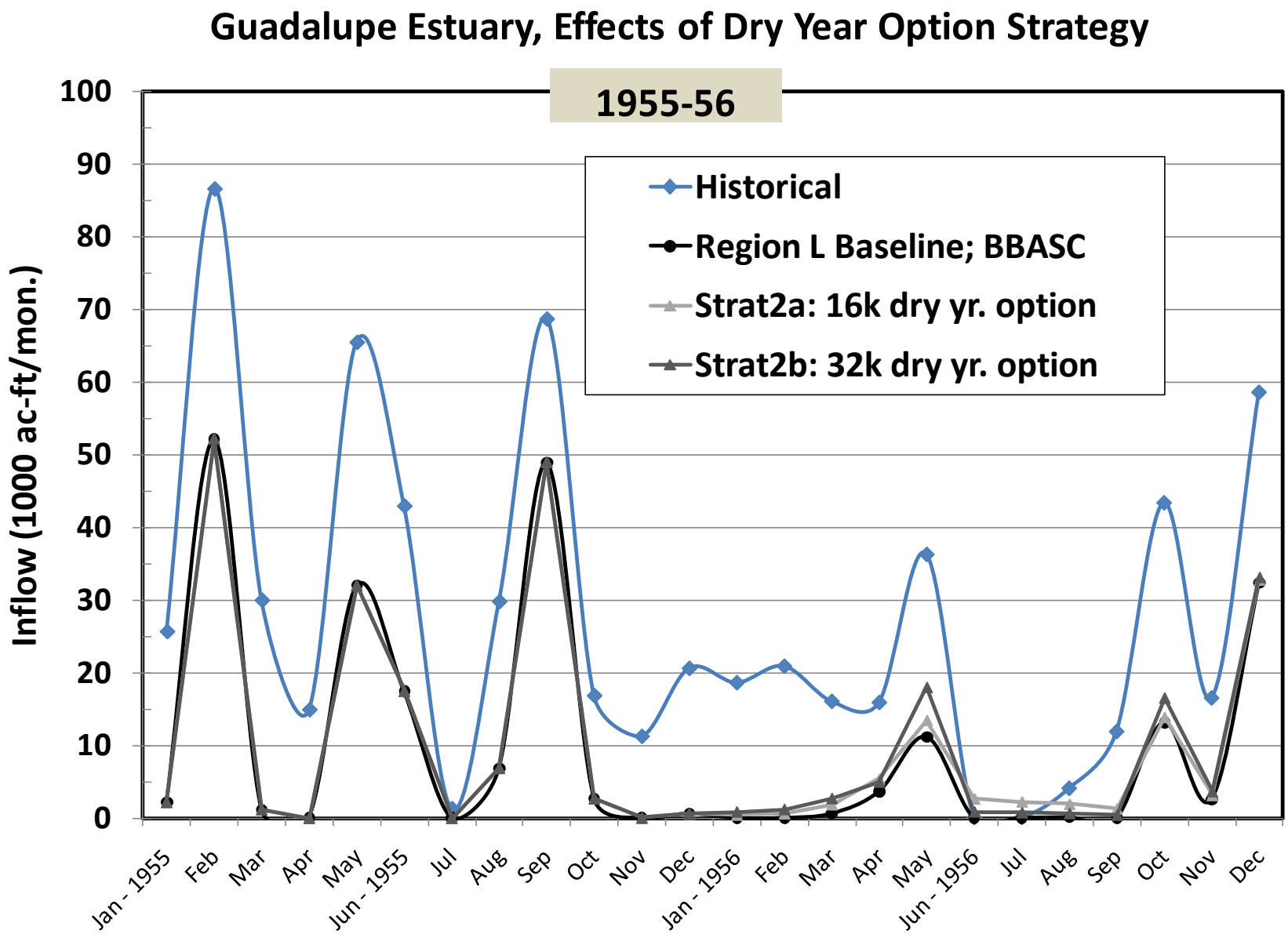


# Strategy #3 Under-utilized Rights– selected water rights

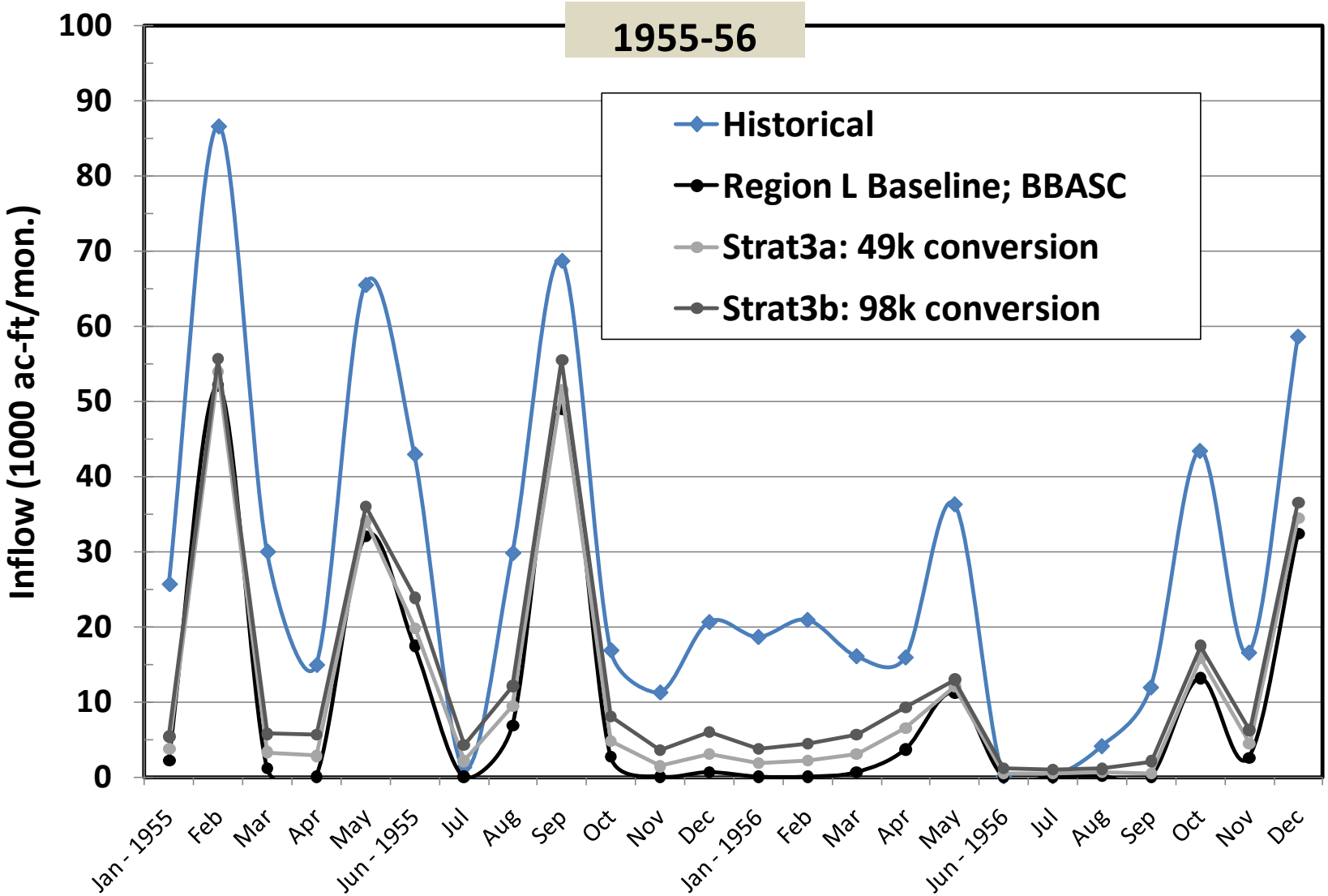


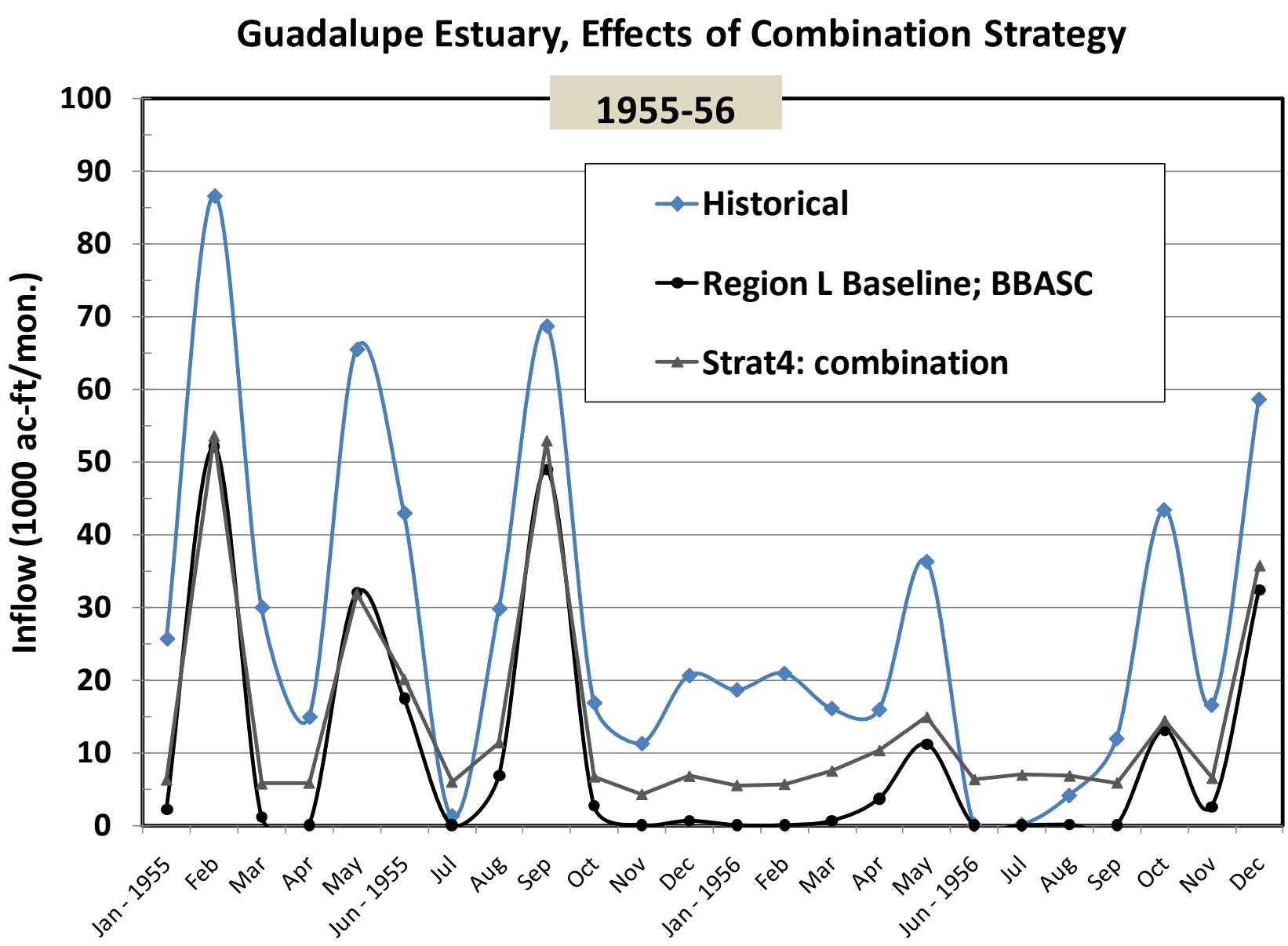

Guadalupe Estuary, Effects of Wastewater Dedication Strategy
1955-56
Historical
Region L Baseline; BBASC
Strat1a: 60K ww
Strat1b: 120K ww
Inflow (1000 ac-ft/mon.)
100
90
80
70
60
50
40
30
20
10
0
Jan - 1955
Feb
Mar
Apr
May
Jun - 1955
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1956
Feb
Mar
Apr
May
Jun - 1956
Jul
Aug
Sep
Oct
Nov
Dec


Guadalupe Estuary, Effects of Wastewater Dedication Strategy
1987-89
Inflow (1000 ac-ft/mon.)
100
90
80
70
60
50
40
30
20
10
0
Historical
Region L Baseline; BBASC
Strat1a: 60K ww
Strat1b: 120K ww
Jan - 1987
Feb
Mar
Apr
May
Jun - 1987
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1988
Feb
Mar
Apr
May
Jun - 1988
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1989
Feb
Mar
Apr
May
Jun - 1989
Jul
Aug
Sep
Oct
Nov
Dec


Guadalupe Estuary, Effects of Dry Year Option Strategy
1955-56
Historical
Region L Baseline; BBASC
Strat2a: 16k dry yr. option
Strat2b: 32k dry yr. option
Inflow (1000 ac-ft/mon.)
100
90
80
70
60
50
40
30
20
10
0
Jan - 1955
Feb
Mar
Apr
May
Jun - 1955
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1956
Feb
Mar
Apr
May
Jun - 1956
Jul
Aug
Sep
Oct
Nov
Dec

# Guadalupe Estuary, Effects of Under-Utilized Rights Conversion Strategy



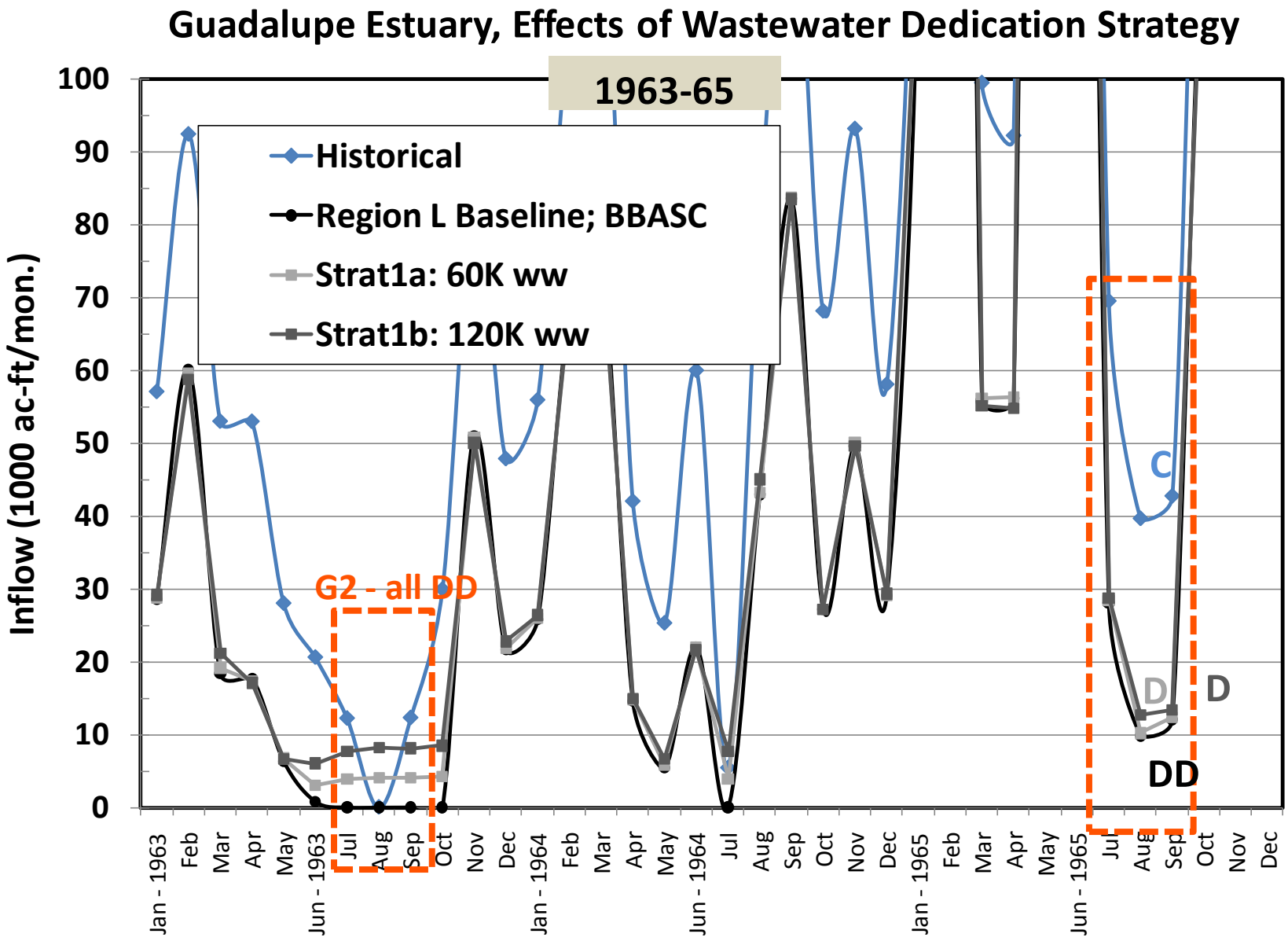

Guadalupe Estuary, Effects of Combination Strategy
1955-56
Historical
Region L Baseline; BBASC
Strat4: combination
Inflow (1000 ac-ft/mon.)
100
90
80
70
60
50
40
30
20
10
0
Jan - 1955
Feb
Mar
Apr
May
Jun - 1955
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1956
Feb
Mar
Apr
May
Jun - 1956
Jul
Aug
Sep
Oct
Nov
Dec

# Strategy Effects: #1 Wastewater Dedication
# Attainment of G1 Springtime Criteria (Rangia)

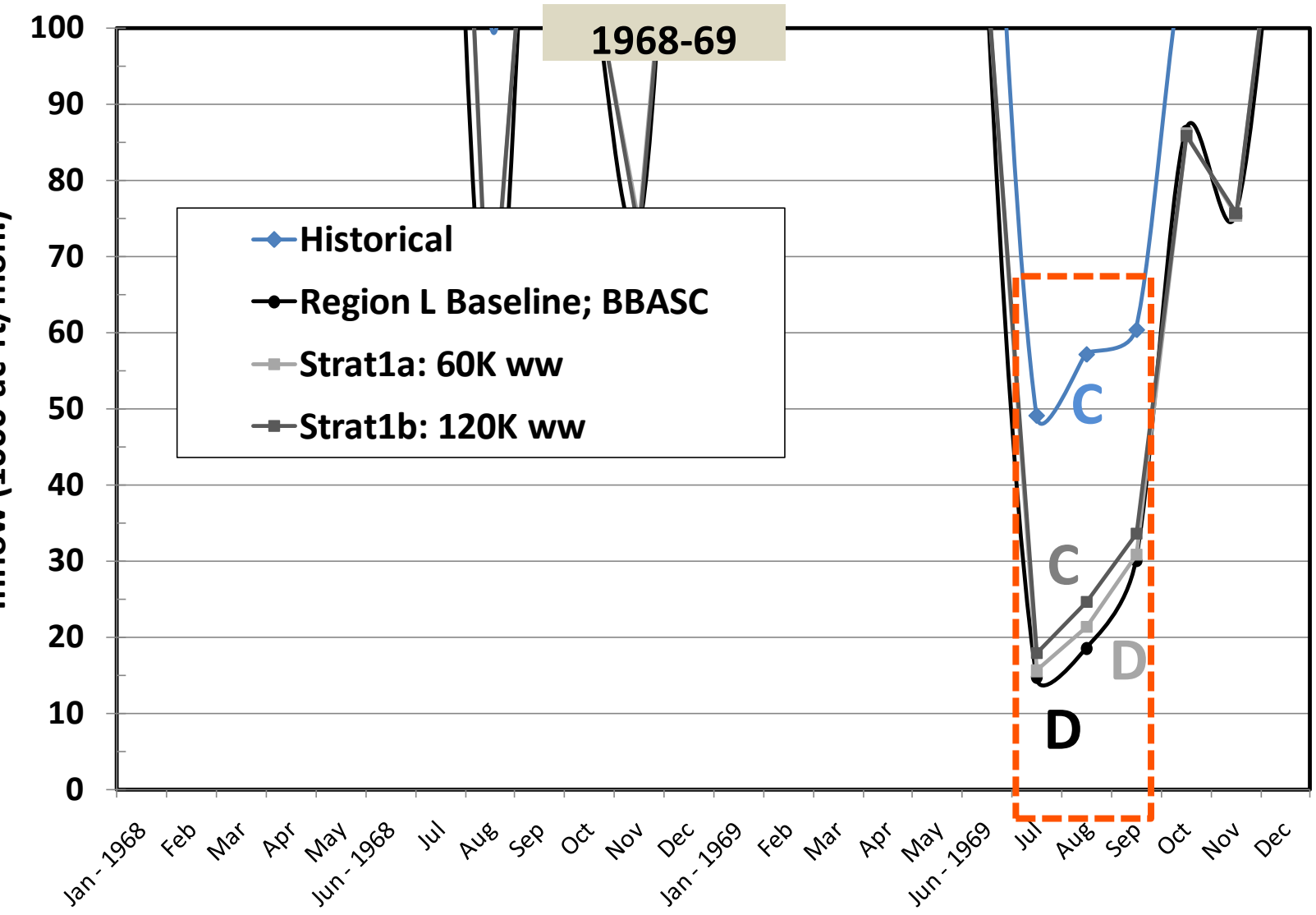
| **Counts** | Criteria G1 Attainment (no. years) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Scenario | >A-pr | A-pr | A | B | C | CC | D | sum |
| Historical | 9 | 14 | 7 | 4 | 5 | 5 | 5 | 49 |
| Region L Baseline; BBASC | 7 | 10 | 8 | 3 | 3 | 4 | **14** | 49 |
| Strat1a - Ww Ded. 60k/yr | 7 | 10 | 8 | 3 | 3 | 4 | 14 | 49 |
| Strat1b - Ww Ded. 120k/yr | 7 | 10 | 8 | 3 | 3 | 4 | 14 | 49 |

# Strategy Effects: #1 Wastewater Dedication
# Attainment of G2 Summer Criteria (oysters)

| **Counts** | Criteria G2 Attainment (no. years) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Scenario | >A-pr | A-pr | A | B | C | CC | D | DD | sum |
| Historical | 8 | 11 | 11 | 8 | 5 | 1 | 1 | 4 | 49 |
| Region L Baseline; BBASC | 4 | 8 | 8 | 8 | 7 | 3 | 3 | 8 | 49 |
| Strat1a - Ww Ded. 60k/yr | 4 | 8 | 8 | 8 | 7 | 3 | 4 | 7 | 49 |
| Strat1b - Ww Ded. 120k/yr | 4 | 8 | 8 | 8 | 8 | 3 | 3 | 7 | 49 |


Guadalupe Estuary, Effects of Wastewater Dedication Strategy
1963-65
Historical
Region L Baseline; BBASC
Strat1a: 60K ww
Strat1b: 120K ww
Inflow (1000 ac-ft/mon.)
100
90
80
70
60
50
40
30
20
10
0
G2 - all DD
C
D
D
DD
Jan - 1963
Feb
Mar
Apr
May
Jun - 1963
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1964
Feb
Mar
Apr
May
Jun - 1964
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1965
Feb
Mar
Apr
May
Jun - 1965
Jul
Aug
Sep
Oct
Nov
Dec

# Guadalupe Estuary, Effects of Wastewater Dedication Strategy



# Strategy Effects: #2 Dry Year Option
# Attainment of G1 Springtime Criteria (Rangia)

| **Counts** | Criteria G1 Attainment (no. years) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Scenario | >A-pr | A-pr | A | B | C | CC | D | sum |
| Historical | 9 | 14 | 7 | 4 | 5 | 5 | 5 | 49 |
| Region L Baseline; BBASC | 7 | 10 | 8 | 3 | 3 | 4 | **14** | 49 |
| Strat2a: 16k dry yr. option | 7 | 11 | 7 | 3 | 3 | 5 | 13 | 49 |
| Strat2b: 32k dry yr. option | 7 | 11 | 7 | 3 | 3 | 5 | 13 | 49 |

# Strategy Effects: #2 Dry Year Option
# Attainment of G2 Summer Criteria (oysters)

| **Counts** | Criteria G2 Attainment (no. years) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Scenario | >A-pr | A-pr | A | B | C | CC | D | DD | sum |
| Historical | 8 | 11 | 11 | 8 | 5 | 1 | 1 | 4 | 49 |
| Region L Baseline; BBASC | 4 | 8 | 8 | 8 | 7 | **3** | **3** | **8** | 49 |
| Strat2a: 16k dry yr. option | 4 | 8 | 8 | 8 | 7 | 3 | 4 | 7 | 49 |
| Strat2b: 32k dry yr. option | 4 | 8 | 8 | 8 | 7 | 3 | 4 | 7 | 49 |

# Strategy Effects: #3 Convert Under-utilized
# #4 Combination (1a, 2a, 3a)
# Attainment of G1 Springtime Criteria (Rangia)

| **Counts** | Criteria G1 Attainment (no. years) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Scenario | >A-pr | A-pr | A | B | C | CC | D | sum |
| Historical | 9 | 14 | 7 | 4 | 5 | 5 | 5 | 49 |
| Region L Baseline; BBASC | 7 | 10 | 8 | 3 | 3 | 4 | **14** | 49 |
| Strat3a: 49k conversion | 7 | 11 | 7 | 5 | 3 | 4 | 12 | 49 |
| Strat3b: 98k conversion | 7 | 12 | 6 | 5 | 3 | 5 | 11 | 49 |
| Strat4: combination | 7 | 11 | 7 | 5 | 3 | 5 | 11 | 49 |

# Strategy Effects: #3 Convert Under-utilized
# #4 Combination (1a, 2a, 3a)
# Attainment of G2 Summer Criteria (oysters)

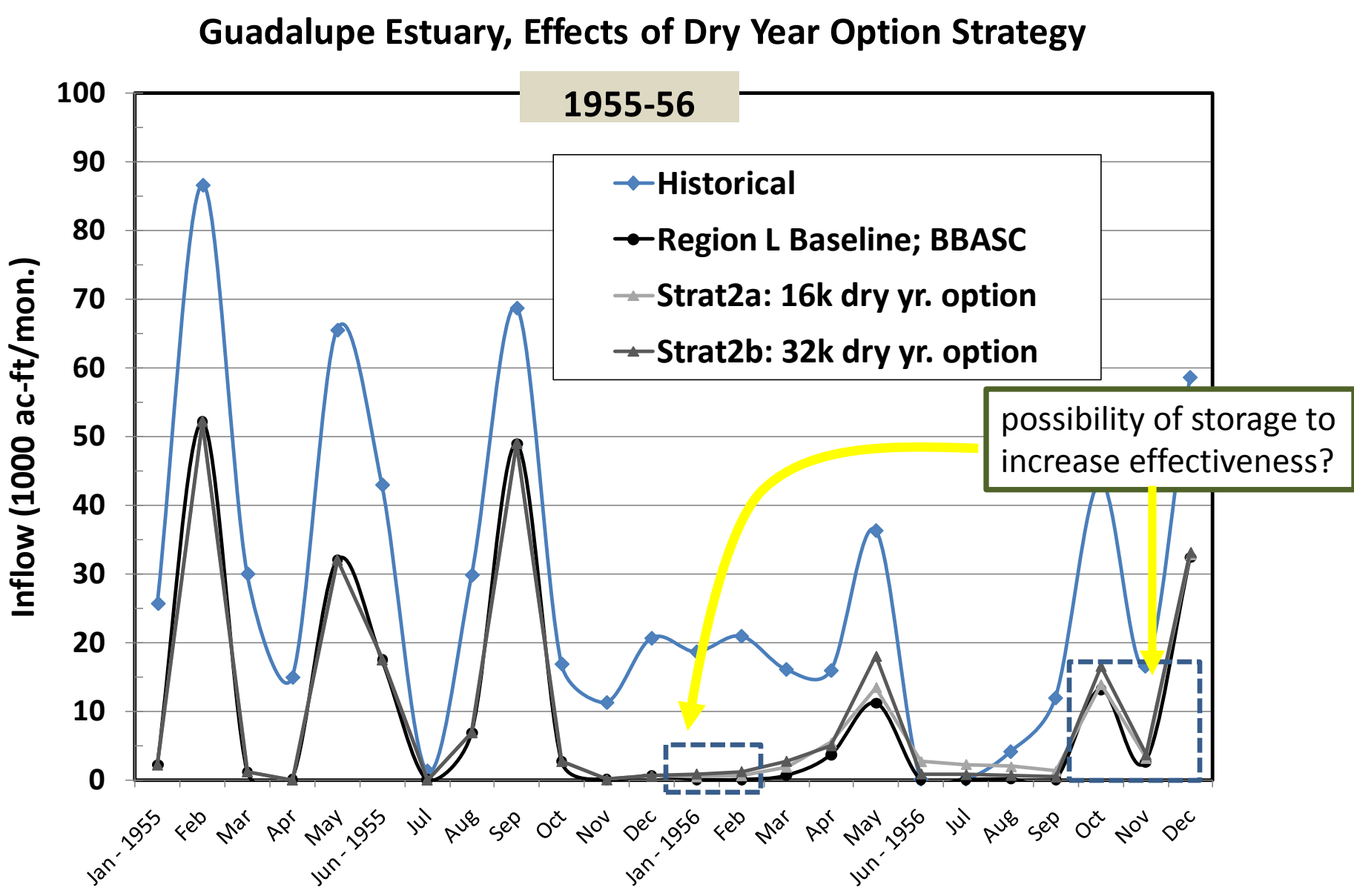
| **Counts** | Criteria G2 Attainment (no. years) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Scenario | >A-pr | A-pr | A | B | C | CC | D | DD | sum |
| Historical | 8 | 11 | 11 | 8 | 5 | 1 | 1 | 4 | 49 |
| Region L Baseline; BBASC | 4 | 8 | 8 | 8 | 7 | 3 | 3 | 8 | 49 |
| Strat3a: 49k conversion | 4 | 8 | 8 | 9 | 6 | 3 | 4 | 7 | 49 |
| Strat3b: 98k conversion | 4 | 8 | 8 | 10 | 7 | 2 | 4 | 6 | 49 |
| Strat4: combination | 4 | 8 | 8 | 9 | 7 | 3 | 3 | 7 | 49 |

# CONCLUSIONS

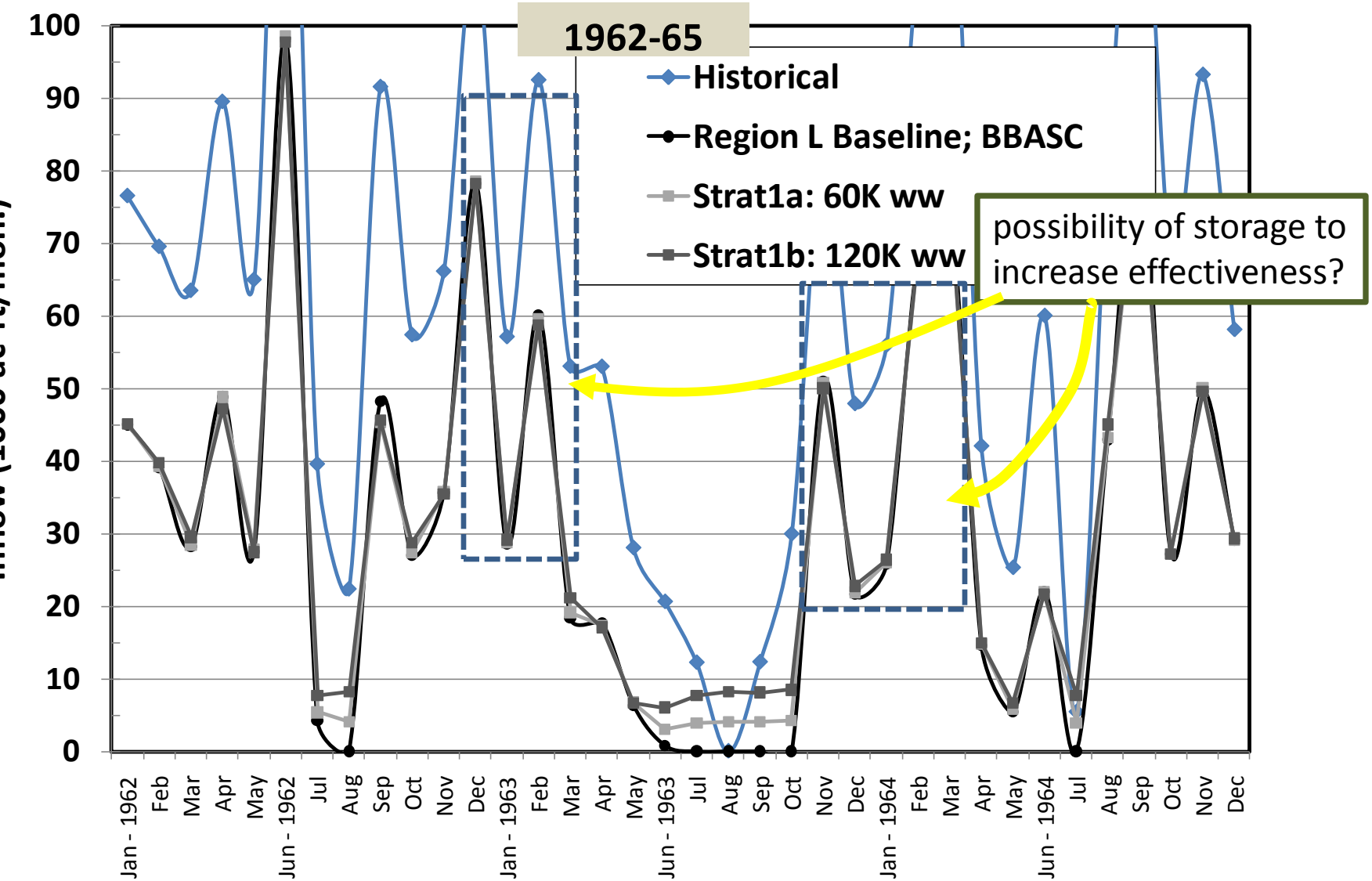
- a) Strategies with most effect of those examined, were wastewater dedication and conversion of under-utilized rights [and combination];

-b) Strategies, if implemented as modeled here, would lead to modest changes in categorical attainment in both the G1 and G2 criteria suites;

- c) For many years without categorical improvement, especially the driest, many positive changes in inflow would still benefit the estuary;


Guadalupe Estuary, Effects of Dry Year Option Strategy
1955-56
Historical
Region L Baseline; BBASC
Strat2a: 16k dry yr. option
Strat2b: 32k dry yr. option
possibility of storage to increase effectiveness?
Inflow (1000 ac-ft/mon.)
100
90
80
70
60
50
40
30
20
10
0
Jan - 1955
Feb
Mar
Apr
May
Jun - 1955
Jul
Aug
Sep
Oct
Nov
Dec
Jan - 1956
Feb
Mar
Apr
May
Jun - 1956
Jul
Aug
Sep
Oct
Nov
Dec

# Guadalupe Estuary, Effects of Wastewater Dedication Strategy



# CONCLUSIONS

- a) Strategies with most effect of those examined, were wastewater dedication and conversion of under-utilized rights [and combination];

-b) Strategies, if implemented as modeled here, would lead to modest changes in categorical attainment in both the G1 and G2 criteria suites;

- c) For many years without categorical improvement, especially the driest, many positive changes in inflow would still benefit the estuary;

- d) Potential for synergistic effects if Strategy(ies) could be coupled with storage.