SAN JOAQUIN RIVER RESTORATION PROGRAM

Habitat Deficit Calculations

Restoration Goal Technical Feedback Meeting
July 19, 2012

Preliminary draft – subject to change

Calculation Steps

- Needed Suitable Habitat from ESHE
- Available Suitable Habitat from hydraulic model
- Calculate Suitable Habitat Deficit / Surplus
- Calculate Total Inundated Area Deficit / Surplus
  - % of inundated area that is suitable per reach
- Calculate 2B / 4B Total Inundated Area to enclose

Step 1: Needed Suitable Habitat Range

Reach	Upper Production Target, Low Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, Average Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, High Habitat Quality, Low "Flow" Scenario (acres)	Lower Production Target, High Habitat Quality, High "Flow" Scenario (acres)
1B	650	182	51	11
2A	1172	329	92	27
2B	507	142	40	6
3	733	205	58	6
4A	331	93	26	1
4B1	165	46	13	0
4B2	44	12	3	0
5	33	9	3	0

Step 2: Available suitable habitat

- Calculate overall available suitable habitat by weighting water year type acreages according to Exhibit B percentages
  - Wet = 20%
  - Normal = 60%
  - Dry = 20%

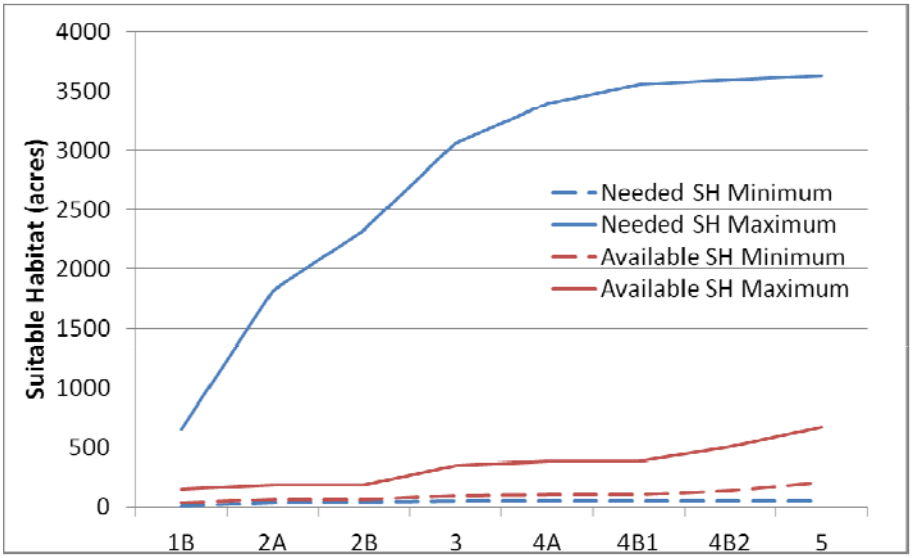
Step 2: Available Suitable Habitat

Reach	Maximum Cover Available Suitable Habitat (acres)	Minimum Cover Available Suitable Habitat (acres)
1B	149	37
2A	33	26
2B		
3	142	28
4A	33	10
4B1		
4B2	124	35
5	173	49

Step 3: Calculate Suitable Habitat Deficit

- Subtract minimum available habitat from the maximum needed habitat to obtain the upper boundary
- Subtract the maximum available habitat from the minimum needed habitat to obtain a lower bound

Step 3: Calculate Suitable Habitat Deficit



Step 3: Calculate Suitable Habitat Deficit

Reach	Suitable Habitat Deficit / Surplus Range (acres)
1B	613 deficit to 138 surplus
2A	1146 deficit to 6 surplus
3	705 deficit to 136 surplus
4A	321 deficit to 32 surplus
4B2	9 deficit to 124 surplus
5	16 surplus to 173 surplus

Step 4: Calculate Total Inundated Area Deficit

- Use 2D hydraulic results to determine the percentage of inundated area in each reach that meets criteria
- Average of 3 water year types
- Assumed average of other reaches for 2B and 4B1 % of inundated area meeting criteria
- Suitable Habitat Deficit / % = Total Inundated Area

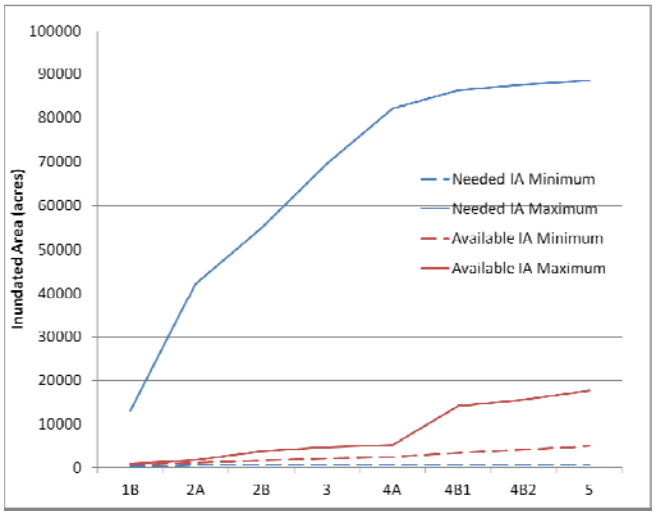
Step 4: Calculate Total Inundated Area Deficit

- Percentage of inundated area by reach that meets criteria

Reach	Max Cover	Min Cover
1B	19.7%	5.0%
2A	5.0%	4.0%
2B	13.0%	4.0%
3	18.7%	5.0%
4A	9.0%	2.7%
4B1	13.0%	4.0%
4B2	13.0%	3.3%
5	13.7%	3.3%

Step 4: Calculate Total Inundated Area Deficit

Cumulative Inundated Area Needed & Available



Step 4: Calculate Total Inundated Area Deficit (Maximum Cover)

Reach	Upper Production Target, Low Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, Average Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, High Habitat Quality, Low "Flow" Scenario (acres)	Lower Production Target, High Habitat Quality, High "Flow" Scenario (acres)
1B	2,550	170	-500	-700
2A	22,780	5,920	1,180	-120
2B	3,900	1,090	310	50
3	3,160	340	-450	-730
4A	3,310	660	-80	-360
4B1	1,270	350	100	0
4B2	-620	-860	-930	-950
5	-1,020	-1,200	-1,240	-1,270

Step 4: Calculate Total Inundated Area Deficit (Minimum Cover)

Reach	Upper Production Target, Low Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, Average Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, High Habitat Quality, Low "Flow" Scenario (acres)	Lower Production Target, High Habitat Quality, High "Flow" Scenario (acres)
1B	12,250	2,890	270	-530
2A	28,660	7,580	1,660	30
2B	12,680	3,550	1,000	150
3	14,100	3,540	600	-440
4A	12,040	3,110	600	-340
4B1	4,130	1,150	330	0
4B2	270	-690	-960	-1,050
5	-490	-1,210	-1,390	-1,480

Step 4: Calculate Total Inundated Area Deficit

Reach	Inundated Area Deficit / Surplus Range (acres)
1B	12,250 deficit to 700 surplus
2A	28,660 deficit to 120 surplus
2B	12,680 deficit to 50 deficit
3	14,100 deficit to 730 surplus
4A	12,040 deficit to 360 surplus
4B1	4,130 deficit to 0 deficit
4B2	270 deficit to 1,050 surplus
5	490 surplus to 1,480 surplus

Step 5: Calculate 2B / 4B Total Inundated Area to Enclose

Assumptions:

- All Reach 1B, 2A, 2B and Reach 3 habitat must be incorporated into the Reach 2B project
- All Reach 4A, 4B1, 4B2, and 5 habitat must be incorporated into the Reach 4B project

Step 5: Calculate 2B / 4B Total Inundated Area to Enclose

Reach	Reach 2B and 4B Projects Inundated Area Deficit / Surplus Range (acres)
2B	67,690 deficit to 1,500 surplus
4B1 / ESB	15,950 deficit to 2,890 surplus

Habitat Quality Tradeoffs

Reach	Upper Production Target, Low Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, Average Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, High Habitat Quality, Low "Flow" Scenario (acres)
1B	12,250	2,890	270
2A	28,660	7,580	1,660
2B	12,680	3,550	1,000
3	14,100	3,540	600
4A	12,040	3,110	600
4B1	4,130	1,150	330
4B2	270	-690	-960
5	-490	-1,210	-1,390

"Flow" Tradeoffs

"Flow" corresponds to ESHE parameters for fish entry timing and migration speed

Reach	Upper Production Target, Average Habitat Quality, Low "Flow" Scenario (acres)	Upper Production Target, Average Habitat Quality, High "Flow" Scenario (acres)
1B	2,890	50
2A	7,580	2,310
2B	3,550	730
3	3,540	180
4A	3,110	-40
4B1	1,150	230
4B2	-690	-990
5	-1,210	-1,450

Assumptions / Limitations

- Calculates inundated area based on existing habitat quality
- Averages available habitat water year types
- Assumes 2B project includes Reach 1, 2, and 3 floodplain and 4B project includes 4 and 5 floodplain
- Must determine which cover criteria correspond to which level of habitat quality

Questions?

Step 4: Calculate Total Inundated Area Deficit (Minimum Cover)

Inundated Area Deficit (acres)

# Fish	Low	Low	Low	Low	Low	Low	High	High	High	High	High	High
Quality	High	High	Avg	Avg	Low	Low	High	High	Avg	Avg	Low	Low
"Flow"	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
1B	130	-530	2,370	10	10,370	1,930	270	-530	2,890	50	12,250	2,130
2A	1,330	30	6,430	1,810	24,630	8,110	1,660	180	7,580	2,310	28,660	9,910
2B	750	150	2,650	500	9,480	1,750	1,000	200	3,550	730	12,680	2,630
3	160	-440	1,980	-140	8,500	960	600	-360	3,540	180	14,100	2,060
4A	-40	-340	860	-300	4,010	-40	600	-300	3,110	-40	12,040	830
4B1	30	0	100	30	350	50	330	50	1,150	230	4,130	780
4B2	-1,050	-1,050	-1,050	-1,050	-990	-1,050	-960	-1,050	-690	-990	270	-870
5	-1,480	-1,480	-1,480	-1,480	-1,420	-1,480	-1,390	-1,480	-1,210	-1,450	-490	-1,330