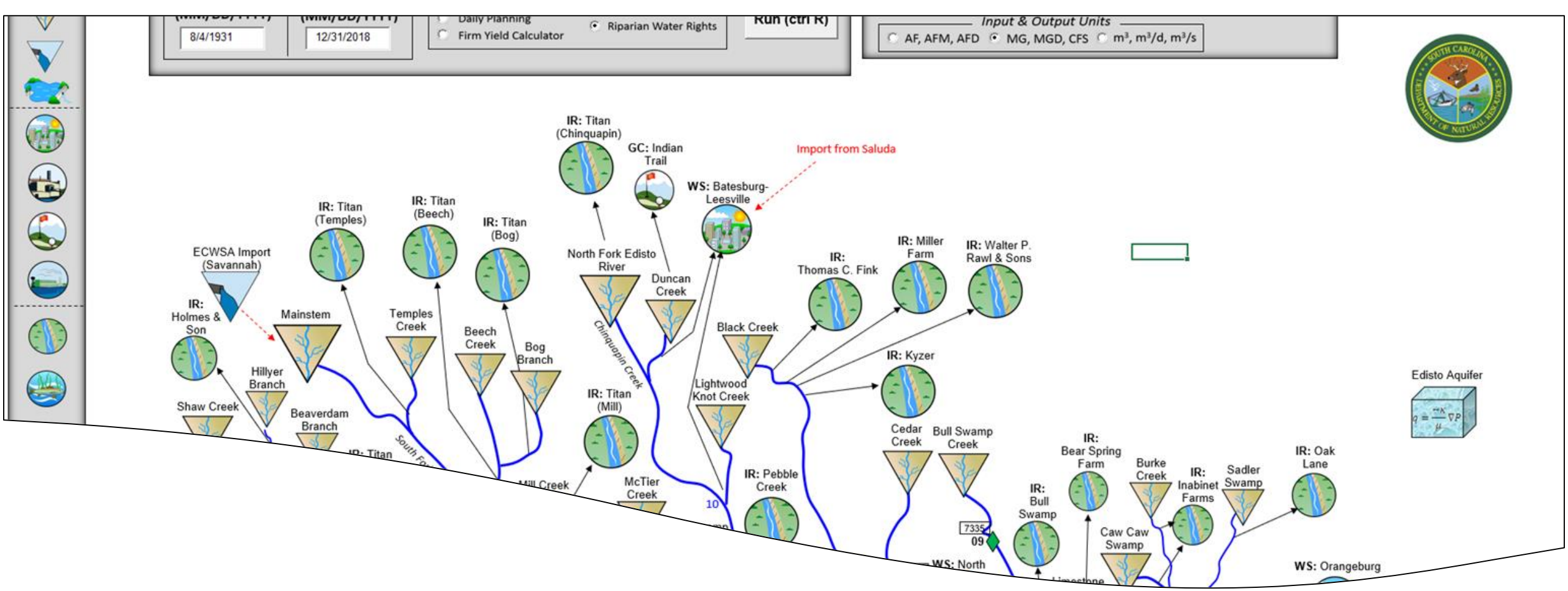


Surface Water Discussion

October 20, 2021 ERBC Meeting

Minimum Instream Flows

- Per the South Carolina Surface Water Withdrawal, Permitting Use, And Reporting Act, the minimum instream flow is defined as **the flow that provides an adequate supply of water at the surface water withdrawal point to maintain the biological, chemical, and physical integrity of the stream taking into account the needs of downstream users, recreation, and navigation and that flow is set at forty percent of the mean annual daily flow for the months of January, February, March, and April; thirty percent of the mean annual daily flow for the months of May, June, and December; and twenty percent of the mean annual daily flow for the months of July through November for surface water withdrawers as described in Section 49-4-150(A)**.

Strategic Nodes

HUC 10 Outlet

USGS Gage

Other Strategic Nodes

Black outline - Use USGS gage daily flows to calculate mean and median 20/30/40 flows over entire period of record.

Purple outline – Use reference gage flows (in black outline) to calculate daily flows, then mean and median 20/30/40 flows over entire period of record.

HUC 301

EDO3 NEAR MONTMORENCI

OUTLET OF SHAW CREEK

EDO10 AT OREANGEBURG

EDO5 NEAR DENMARK

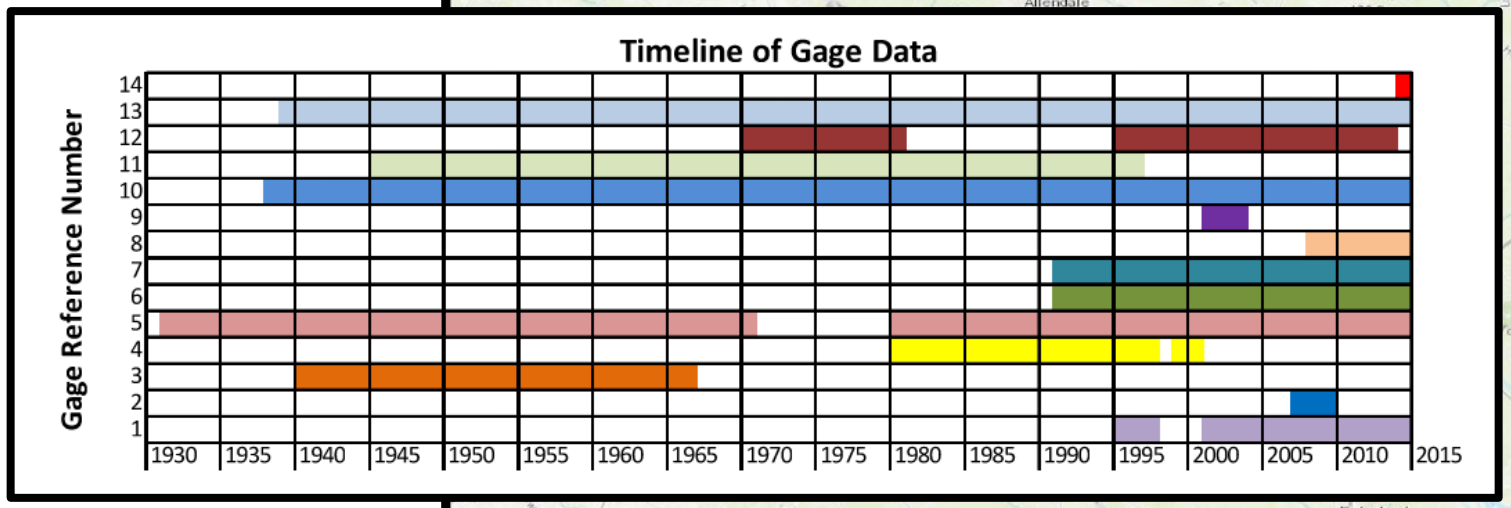
HUC 303

EDO11 NEAR BRANCHVILLE

OUTLET OF FOUR HOLE SWAMP

EDO13 NEAR GIVHANS

ED05 (02173000) South Fork Edisto near Denmark
ED010 (02173500) North Fork Edisto at Orangeburg
ED013 (02175000) Edisto River near Givhans



Minimum Instream Flows (MIFs) at Strategic Nodes

MIFs based on Percentage of Mean Flow

Strategic Node	Location	20, 30 and 40 Percent of Mean Daily Flow (cfs)		
		40%	30%	20%
		Jan, Feb, Mar and Apr	May, Jun and Dec	Jul, Aug, Sep, Oct and Nov
EDO05	South Fork Edisto	286	214	143
Outlet of Shaw Creek	Shaw Creek	54	40	27
EDO03	South Fork Edisto	78	58	39
EDO13	Edisto River	974	730	487
Outlet of 4 Hole	Four Hole Swamp	233	175	117
HUC 303	North Fork Edisto	320	240	160
EDO11	South Fork Edisto	613	460	307
HUC 301	North Fork Edisto	101	76	51
EDO10	North Fork Edisto	287	216	144

MIFs at EDO5, EDO10 and EDO13 are derived from daily flows measured at USGS stream gages at those locations. Each location has approximately 32,000 days (~87 years) of flow records.

MIFs at all other strategic nodes were estimated using gage data from EDO05, ED010, or ED013. Flows were scaled in proportion to the difference in drainage areas between the reference node (gage) and strategic node.

Frequency of Days Below MIFs at Select Strategic Nodes for Each Planning Scenario

Strategic Node	Scenario	Frequency (%) of Days below MIFs											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
EDO05 (S. Fork Edisto near Denmark)	Unimpaired Flow (UIF)	0	0	0	1	1	4	0	1	0	0	0	0
	Current Use	0	0	0	1	3	10	2	1	0	0	0	0
	Business as Usual (2070)	0	0	0	1	4	13	3	2	1	0	0	0
	High Demand (2070)	0	0	0	1	7	16	7	3	2	0	0	0
	Full Allocation	15	15	8	23	41	54	45	45	52	47	31	17
Outlet of Shaw Creek	Unimpaired Flow (UIF)	0	0	0	1	1	4	0	1	0	0	0	0
	Current Use	0	0	0	1	3	9	1	1	0	0	0	0
	Business as Usual (2070)	0	0	0	1	6	12	4	2	2	0	0	0
	High Demand (2070)	0	1	0	2	9	17	10	6	4	2	0	1
	Full Allocation	2	2	0	3	9	17	10	7	8	4	1	1
EDO03 (South Fork Edisto near Montmorenci)	Unimpaired Flow (UIF)	0	0	0	1	0	2	0	0	0	0	0	0
	Current Use	0	0	0	1	2	6	1	1	0	0	0	0
	Business as Usual (2070)	0	0	0	1	2	6	1	1	0	0	0	0
	High Demand (2070)	0	0	0	1	2	6	1	1	0	0	0	0
	Full Allocation	0	1	0	1	2	7	1	1	1	0	0	0
EDO13 (Edisto near Givhans)	Unimpaired Flow (UIF)	4	2	1	7	13	19	10	9	8	4	2	3
	Current Use	5	3	1	9	20	27	17	16	14	8	3	4
	Business as Usual (2070)	7	4	3	13	28	37	25	25	23	15	6	7
	High Demand (2070)	8	5	4	16	33	44	33	31	31	22	9	8
	Full Allocation	24	19	15	31	56	67	62	60	66	67	55	33
Outlet of Four Hole Swamp	Unimpaired Flow (UIF)	23	16	14	32	48	57	45	42	54	52	38	28
	Current Use	21	13	12	29	44	55	41	39	49	46	32	25
	Business as Usual (2070)	22	15	14	31	47	56	44	41	52	51	36	27
	High Demand (2070)	22	15	13	31	46	56	43	41	51	50	35	26
	Full Allocation	23	15	14	31	47	56	42	41	51	49	36	28

Frequency of Days Below MIFs at Select Strategic Nodes for Each Planning Scenario

Strategic Node	Scenario	Frequency (%) of Days below MIFs											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HUC 303 (Lower North Fork Edisto)	Unimpaired Flow (UIF)	0	0	0	1	0	2	0	0	0	0	0	0
	Current Use	0	0	0	1	1	5	0	0	0	0	0	0
	Business as Usual (2070)	0	0	0	1	1	5	0	0	0	0	0	0
	High Demand (2070)	0	0	0	1	2	7	1	1	0	0	0	0
	Full Allocation	1	1	0	1	4	9	2	2	2	1	0	1
EDO11 (Edisto nr Branchville)	Unimpaired Flow (UIF)	0	0	0	1	0	3	0	0	0	0	0	0
	Current Use	0	0	0	1	1	5	0	0	0	0	0	0
	Business as Usual (2070)	0	0	0	1	2	7	1	1	0	0	0	0
	High Demand (2070)	0	0	0	1	3	9	2	2	0	0	0	0
	Full Allocation	5	3	1	8	18	25	17	16	14	9	5	4
HUC 301 (Upper North Fork Edisto)	Unimpaired Flow (UIF)	0	0	0	1	0	2	0	0	0	0	0	0
	Current Use	0	0	0	1	1	3	0	0	0	0	0	0
	Business as Usual (2070)	0	0	0	1	1	4	0	0	0	0	0	0
	High Demand (2070)	0	0	0	1	1	5	0	0	0	0	0	0
	Full Allocation	0	0	0	1	1	4	0	0	0	0	0	0
EDO10 (N. Fork Edisto at Orangeburg)	Unimpaired Flow (UIF)	0	0	0	1	0	1	0	0	0	0	0	0
	Current Use	0	0	0	1	1	4	0	0	0	0	0	0
	Business as Usual (2070)	0	0	0	1	1	4	0	0	0	0	0	0
	High Demand (2070)	0	0	0	1	1	5	0	1	0	0	0	0
	Full Allocation	3	2	0	3	8	14	7	6	6	3	1	1

Proposed Low Flow Strategy

20% Increments Percent Below MIF	River Flow Range (cfs) Lower	Upper	Basin-wide % Reduction in SW Withdrawals
0 - 20%	266	332	20%
20 - 40%	199	266	40%
40 - 60%	133	199	60%
60 - 80%	66	133	80%
80 - 100%	0	66	100%

Here, MIF is set at 20% of the median daily flow, which is 332 cfs at Givhans Ferry

Current Use Scenario Basin-wide Consumptive Use by Month

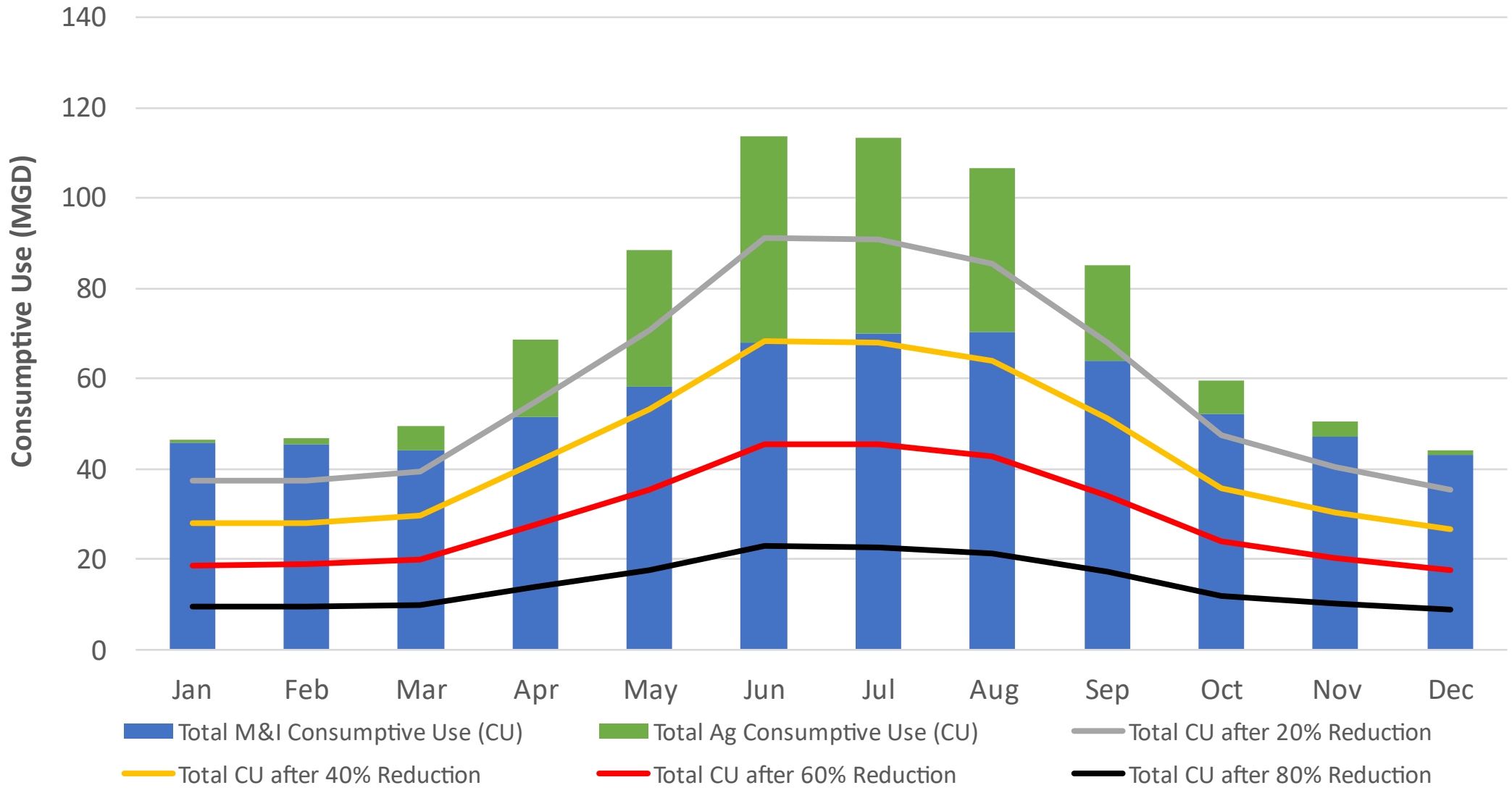


Table 1. Frequency of Days Below **487 cfs** (**20% of Mean Daily Flow**) at Givhans Ferry for Each Planning Scenario and Month

Strategic Node	Scenario	Frequency (%) of Days below 487 cfs (20% of Mean Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	2	5.6	9.6	8.6	7.8	4.1	2	1	4
	Current Use	0	0	0	1	5.9	13.1	17	16	14.0	8.3	3	1	6.9
	Business as Usual (2070)	0	0	0	0.9	12	21	25	25	23	14.7	5.9	1.5	11
	High Demand (2070)	0	0	0	1.4	19	27	33	31	31	22	9.1	2.2	16
	Full Allocation	15	10	6.1	21	48	59	62	60	66	67	55	26	44

No Low Flow Strategy in Place

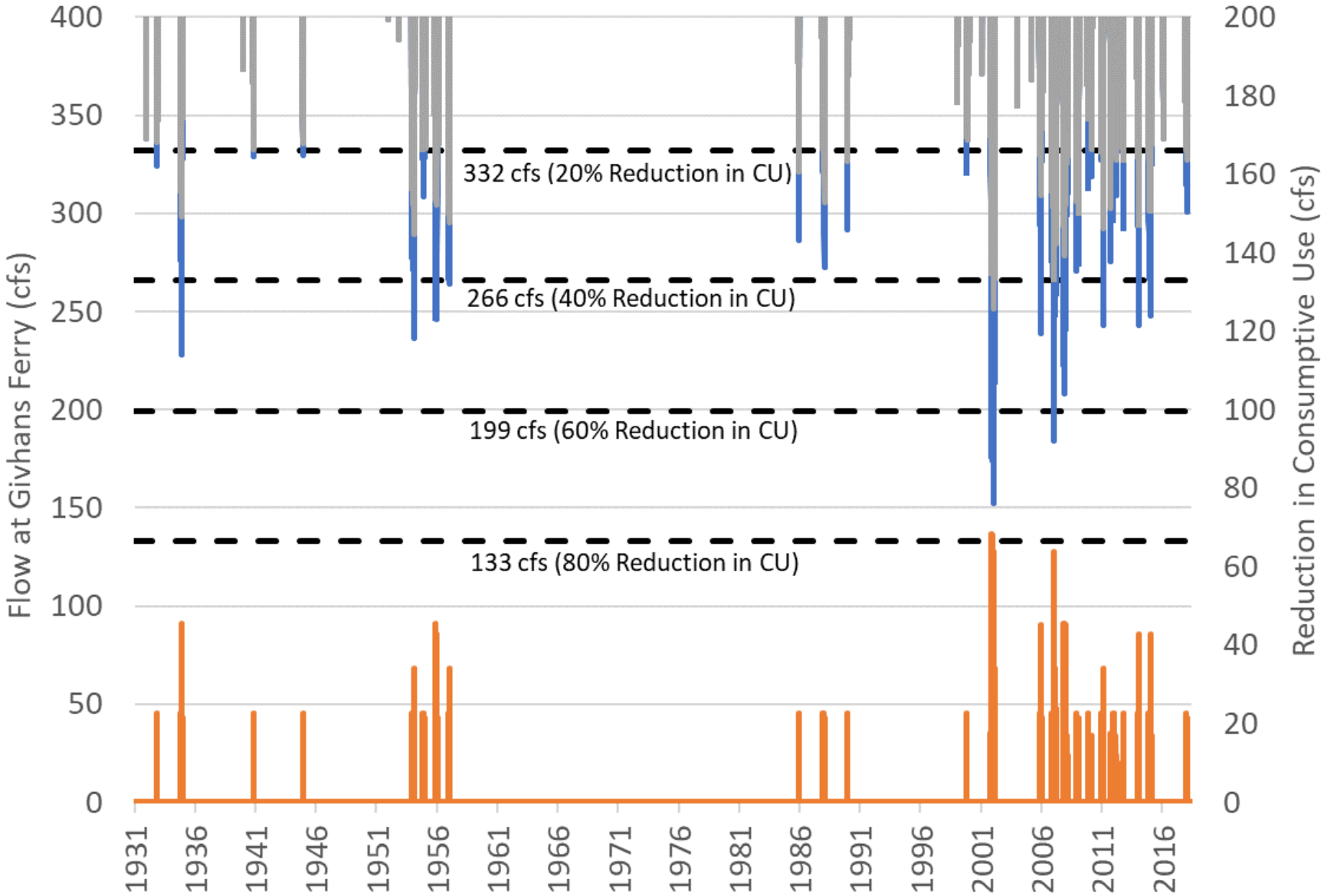
Table 2. Frequency of Days Below **332 cfs** (**20% of Median Daily Flow**) at Givhans Ferry for Each Planning Scenario and Month

Strategic Node	Scenario	Frequency (%) of Days below 20% of Median Daily Flow												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0.7	0.6	0.9	0.2	0.4	0	0	0.2
	Current Use	0	0	0	0	0.8	4.0	7	5	3.7	1.4	0	0	1.9
	Business as Usual (2070)	0	0	0	0.3	5	12	16	15	10	5.3	2.0	0.4	6
	High Demand (2070)	0	0	0	0.8	9	18	22	21	18	10	3.2	0.9	9
	Full Allocation	8	6	3.0	14	39	51	54	53	60	60	45	17	36

No Low Flow Strategy in Place

Impact of Proposed Low Flow Strategy at Givhans Ferry

Only daily flows below 400 cfs are shown



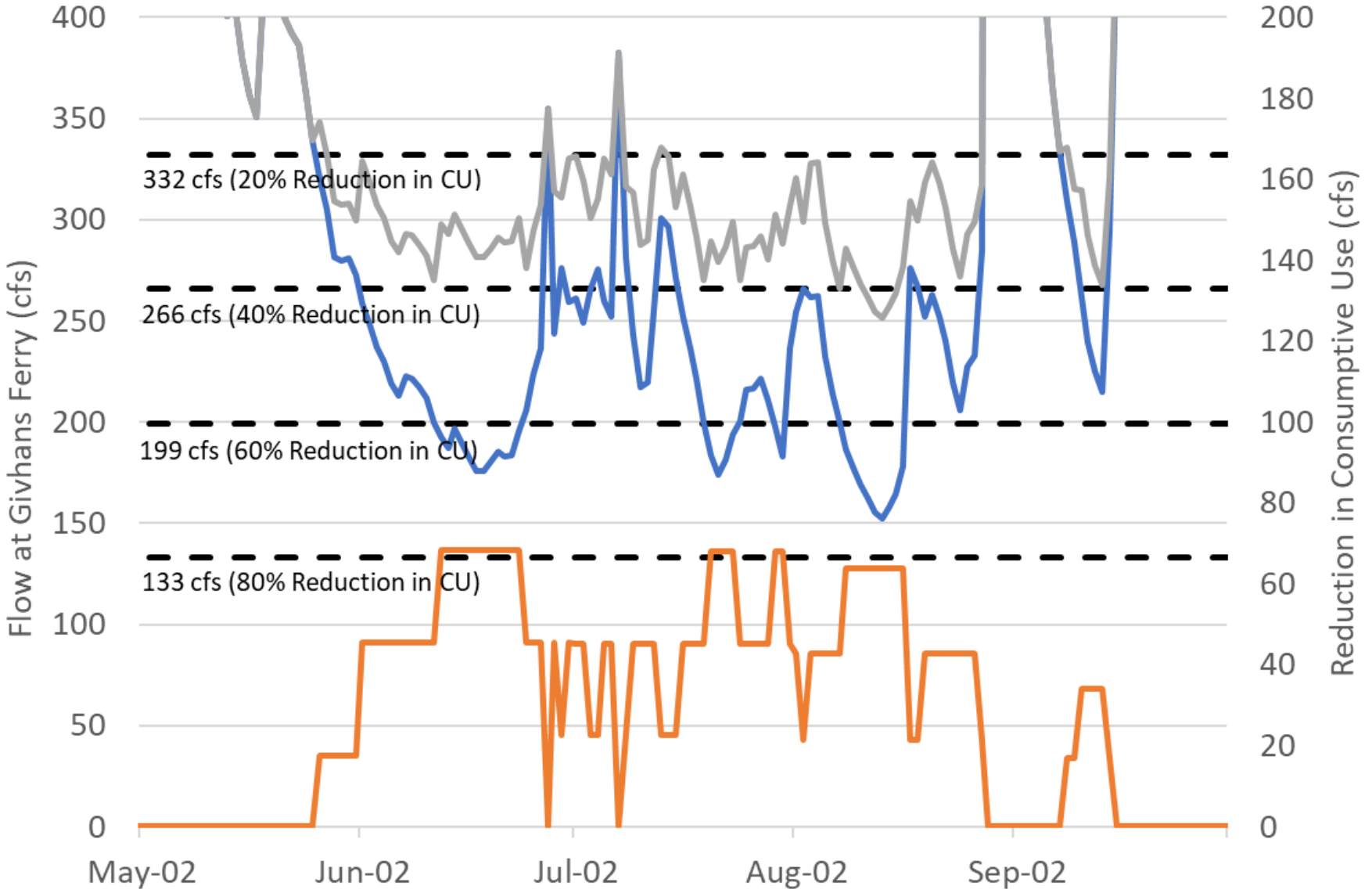
Current Use Scenario

1931 – 2018 Hydrology

- Flow
- Flow under Low Flow Strategy
- Reduction in Withdrawals under Low Flow Strategy

Impact of Proposed Low Flow Strategy at Givhans Ferry

Only daily flows below 400 cfs are shown



Current Use Scenario

2002 Hydrology

- Flow
- Flow under Low Flow Strategy
- Reduction in Withdrawals under Low Flow Strategy

Tables 7a and 7b. Frequency of Days Below **332 cfs** (**20% of Median Daily Flow**) at EDO13 (Givhans Ferry) for UIF, Current Use and High Demand Scenarios

No Low Flow Strategy

Strategic Node	Scenario	Frequency (%) of Days below 20% of Median Daily Flow												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0.7	0.6	0.9	0.2	0.4	0	0	0.2
	Current Use	0	0	0	0	0.8	4.0	7	5	3.7	1.4	0.1	0	1.9
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													

With the Proposed Low Flow Strategy

Strategic Node	Scenario	Frequency (%) of Days below 20% of Median Daily Flow												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0.7	0.6	0.9	0.2	0.4	0	0	0.2
	Current Use	0	0	0	0	0.3	2.9	2.8	3.4	2.6	0.8	0	0	1.1
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													

Additional Slides
(for us as needed)

Table 3. Frequency of Days Below **266 cfs (20% below 20% of Median Daily Flow)** at Givhans Ferry for Each Planning Scenario and Month

Strategic Node	Scenario	Frequency of Days Below 266 cfs (20% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	1.8	1.5	1.8	0.9	0	0	0	0.5
	Business as Usual (2070)	0	0	0	0	2.4	7	12	10	7	2.6	1.0	0	3.8
	High Demand (2070)	0	0	0	0	6	14	19	17	12	6	1.9	0	7
	Full Allocation	6	5	1.8	12	36	46	50	49	56	54	40	14	33

No Low Flow Strategy in Place

Table 4. Frequency of Days Below **199 cfs (40% below 20% of Median Daily Flow)** at Givhans Ferry for Each Planning Scenario and Month

Strategic Node	Scenario	Frequency of Days Below 199 cfs (40% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	0.5	0.2	0.4	0	0	0	0	0
	Business as Usual (2070)	0	0	0	0	0.6	3.8	7	5	2.7	0.6	0	0	1.8
	High Demand (2070)	0	0	0	0	3	10	15	13	7	2.7	1.0	0	4.6
	Full Allocation	4.8	4.0	1.0	9	32	41	45	44	52	48	36	11	29

No Low Flow Strategy in Place

Table 5. Frequency of Days Below **133 cfs (60% below 20% of Median Daily Flow)** at EDO13 (Givhans Ferry) for Each Planning Scenario and Month

Strategic Node	Scenario	Frequency of Days Below 133 cfs (60% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	0	0	0	0	0	0	0	0
	Business as Usual (2070)	0	0	0	0	0	1.8	1.5	1.8	0.2	0	0	0	0.5
	High Demand (2070)	0	0	0	0	1.0	5	10	8	2.9	0.6	0	0	2.5
	Full Allocation	3.7	3.0	0.4	7	28	35	40	39	47	42	30	9	25

No Low Flow Strategy in Place

Table 6. Frequency of Days Below **66 cfs (80% below 20% of Median Daily Flow)** at EDO13 (Givhans Ferry) for Each Planning Scenario and Month

Strategic Node	Scenario	Frequency of Days Below 66 cfs (80% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	0	0	0	0	0	0	0	0
	Business as Usual (2070)	0	0	0	0	0	0.4	0.2	0.4	0	0	0	0	0.1
	High Demand (2070)	0	0	0	0	0.1	2.6	4.2	3.3	0.4	0	0	0	0.9
	Full Allocation	2.7	2.2	0.0	3.8	23	31	35	34	42	36	23	7	21

No Low Flow Strategy in Place

Tables 8a and 8b. Frequency of Days Below **266 cfs (20% below 20% of Median Daily Flow)** at EDO13 (Givhans Ferry) for UIF, Current Use and High Demand Scenarios

No Low Flow Strategy

Strategic Node	Scenario	Frequency of Days Below 266 cfs (20% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0.2	0	0	0	0	0.02
	Current Use	0	0	0	0	0	1.8	1.5	1.8	0.9	0.1	0	0	0.5
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													

With the Proposed Low Flow Strategy

Strategic Node	Scenario	Frequency of Days Below 266 cfs (20% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0.2	0	0	0	0	0.02
	Current Use	0	0	0	0	0	0	0	0.2	0.0	0	0	0	0.1
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													

Tables 9a and 9b. Frequency of Days Below **199 cfs (40% below 20% of Median Daily Flow)** at EDO13 (Givhans Ferry) for UIF, Current Use and High Demand Scenarios

No Low Flow Strategy

Strategic Node	Scenario	Frequency of Days Below 199 cfs (40% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	0.5	0.2	0.4	0	0	0	0	0.1
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													

With the Proposed Low Flow Strategy

Strategic Node	Scenario	Frequency of Days Below 199 cfs (40% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	0	0	0	0	0	0	0	0
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													

Tables 10a and 10b. Frequency of Days Below **133 cfs (60% below 20% of Median Daily Flow)** at EDO13 (Givhans Ferry) for UIF, Current Use and High Demand Scenarios

No Low Flow Strategy

Strategic Node	Scenario	Frequency of Days Below 133 cfs (60% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	0	0	0	0	0	0	0	0
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													

With the Proposed Low Flow Strategy

Strategic Node	Scenario	Frequency of Days Below 133 cfs (60% below 20% of Median Daily Flow)												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
EDO13 (Givhans Ferry)	Unimpaired Flow (UIF)	0	0	0	0	0	0	0	0	0	0	0	0	0
	Current Use	0	0	0	0	0	0	0	0	0	0	0	0	0
	Business as Usual (2070)													
	High Demand (2070)													
	Full Allocation													