



Weekly Assessment of CVP and SWP Delta Operations on ESA-listed Species

November 1, 2022

Executive Summary

Operational Conditions

See Weekly Fish and Water Operation Outlook document for November 1 – November 7.

Winter-run Chinook Salmon

No loss of natural winter-run Chinook Salmon (by length at date, LAD) has occurred in the past week at the State or Federal fish salvage facilities. Loss of natural winter-run Chinook Salmon at the Central Valley Project (CVP) and State Water Project (SWP) fish collection facilities is unlikely to occur over the next week. 0% of juvenile natural winter-run Chinook Salmon from brood year (BY) 2022 are estimated to be present in the Delta. The Delta Cross Channel (DCC) gates closure reduces far-field effects on winter-run Chinook Salmon juveniles that are potentially present in the Sacramento River near the DCC gates into the interior Delta.

Spring-run Chinook salmon

No loss of natural spring-run Chinook Salmon (by length at date, LAD) has occurred in the past week at the State or Federal fish salvage facilities. 0% of juvenile natural spring-run Chinook Salmon from brood year (BY) 2022 are estimated to be present in the Delta. No juvenile natural spring-run Chinook Salmon from BY 2022 have been observed near the DCC gates; CV spring-run Chinook Salmon adults have completed spawning and eggs are in gravel. The DCC closure is unlikely to affect natural spring-run Chinook Salmon in the next seven days.

Central Valley Steelhead

No loss of natural California CV (CCV) steelhead has occurred in the past week at the State and Federal fish salvage facilities. Loss of Central Valley steelhead at the Central Valley Project (CVP) and State Water Project (SWP) fish collection facilities is unlikely to occur over the next week. No estimation of juvenile CCV Steelhead was discussed this week. DCC closure reduces exposure to Central Valley steelhead juveniles that are potentially present in the Sacramento River near the DCC gates.

Green Sturgeon

Loss of green sturgeon has not occurred in the past week at the State and Federal fish salvage facilities (WY 2023 total loss = 0 fish, as of 11/1/2022). Loss of green sturgeon is unlikely to occur over the next week due to their rare presence in the South Delta.

Delta Smelt

Based on distribution patterns over the past decade and no detections in this water year, Delta Smelt are unlikely to be prevalent in the Central and South Delta. Limited detection data from the past 3 months support Delta Smelt presence in the Sacramento Deepwater Shipping Channel and Suisun Marsh. The last Delta Smelt observed was on September 21, 2022, in Grizzly Bay. The likelihood of Delta Smelt subadult entrainment is low due to seasonal timing. First flush conditions are not anticipated to occur within the next seven days. The regulations for Integrated Early Winter Pulse Protection does not go into effect until 12/1/2022.

DCC gates recommendation

The DCC gates were closed on 10/31/2022 to meet Rio Vista flows criteria. Closing the DCC gate may also reduce straying of Mokelumne River fall-run Chinook Salmon attracted by Mokelumne flows. The DCC gate is currently scheduled to re-open on 11/4/2022 for salinity/seasonal weekend operation, and to allow boaters passage to the interior Delta. The gates will then be closed again on 11/7/2022.

Monitoring Teams summary

There were no non-consensus issues to report from the Salmon Monitoring Team.

There were no non-consensus issues to report from the Smelt Monitoring Team.

Operational and Regulatory Conditions

See current Weekly Fish and Water Operation Outlook document.

Biology, Distribution, and Evaluation Winter-run Chinook salmon, Spring-run Chinook salmon, Central Valley Steelhead

Population Status

Winter-run Chinook Salmon

- Delta Life Stages:
 - Juveniles, Adults
- Supporting Information regarding Exposure
 - Catch at Red Bluff Diversion Dam have declined since late September, which suggests that juvenile winter-run Chinook Salmon have mostly migrated towards the middle reaches of the Sacramento River. Tisdale and GCID rotary screw traps have observed some winter-run Chinook Salmon so far.
- Supporting Information regarding DCC Management Effects
 - DCC gate operations will continue with a weekday closed/weekend open pattern. There are no modeling alternatives for water quality due to the Rio Vista flow requirement and a case where the DCC gates left open would likely cause a violation to D-1641.

See Attachment A – Mokelumne River pulse flow plan plot and data.

Spring-run Chinook Salmon

- Delta Life Stages:
 - Young-of-year (YOY) and Yearlings
- Supporting Information regarding Exposure
 - See additional supporting information found in winter-run Chinook Salmon section.

Mill Creek and Deer Creek daily flows were recorded less than 95 cfs over the past week. Butte Creek Rotary Screw trap caught one spring-run yearling on 10/26/22.
- Supporting Information regarding DCC Management Effects
 - See additional supporting information in winter-run Chinook Salmon section.

Central Valley Steelhead

- Delta Life Stages:
 - Spawning Adults, Kelts, Juveniles
- Supporting Information regarding Exposure of CCV Steelhead
 - See Additional supporting information found in winter-run Chinook Salmon.
- Supporting Information regarding DCC Management Effects on Central Valley steelhead
 - See additional supporting information found in winter-run Chinook Salmon.

Distribution

Table 1. Salmonid distribution estimates

Location	Yet to Enter Delta (%)	In the Delta (%)	Exited Delta past Chipps Island (%)
Young-of-year (YOY) winter-run Chinook salmon	Current: 100 % Last Week: 100 %	Current: 0% Last Week: 0 %	Current: 0% Last Week: 0 %
YOY spring-run Chinook salmon	Current: 100 % Last Week: NA	Current: 0% Last Week: NA	Current: 0% Last Week: NA
YOY hatchery winter-run Chinook salmon	Current: NA Last Week: NA	Current: NA Last Week: NA	Current: NA Last Week: NA
Natural origin steelhead	Current: NA Last Week: NA	Current: NA Last Week: NA	Current: NA Last Week: NA

Table 2. Historic migration and salvage patterns. Last updated 10/24/2022.

Date (10/03)	Red Bluff Diversion Dam	Tisdale RST	Knights Landing RST	Sac Trawl (Sherwood) Catch Index	Chipps Island Trawl Catch Index	Salvage
Chinook, Winter-run, Unclipped	72.5% (63.8%,81.1%) BY: 2012 - 2021	12.1% (3.3%,20.8%) BY: 2012 - 2021	11.4% (1.8%,21.0%) BY: 2013 - 2021	7.0% (-8.8%,22.8%) BY: 2012 - 2021	0.0% (0.0%,0.0%) BY: 2012 - 2021	0.0% (0.0%,0.0%) WY: 2013 - 2022
Chinook, Spring-run, Unclipped	2.8% (-1.3%,6.8%) BY: 2012 - 2021	0.1% (0.0%,0.2%) BY: 2012 - 2021	0.4% (-0.4%,1.3%) BY: 2013 - 2021	0.0% (0.0%,0.0%) BY: 2012 - 2021	0.0% (0.0%,0.0%) BY: 2012 - 2021	0.0% (0.0%,0.0%) WY: 2013 - 2022

Date (10/03)	Red Bluff Diversion Dam	Tisdale RST	Knights Landing RST	Sac Trawl (Sherwood) Catch Index	Chippis Island Trawl Catch Index	Salvage
Steelhead, Unclipped (- December-March)	N/A	N/A	N/A	N/A	N/A	0.0% (0.0%,0.0%) WY: 2013 - 2022

Table 3. Knight’s Landing (KLCI) and Sacramento Seine and Trawl (SCI). No catch indices for juvenile salmonid migration were triggered during the past week.

Date	KLCI	SCI Trawl	SCI Seine	Trigger Exceeded
10/24/22	0	0	0	No
10/25/22	0	0	0	No
10/26/22	0	0	0	No
10/27/22	0	N/A	N/A	No
10/28/22	0	0	0	No
10/29/22	0	N/A	N/A	No
10/30/22	0	N/A	N/A	No
10/31/22	0	0	0	No

Table 4. Mean daily flow and percent change (Wilkins Slough, Deer Creek, Mill Creek; cfs from CDEC) and temperature and percent change (Knights Landing; °F from RST).

Date	Mill Creek flow (MLM)	MLM Change	MLM Alert	Deer Creek flow (DCV)	DCV Change	DCV Alert	Wilkins Slough flow (WLK)	Knights Landing temperature (°F)	Alert Triggered
10/30/2022	85.1	0.3%	N/A	71.4	0.5%	N/A	3259.0	46.2	N/A
10/29/2022	84.8	-0.1%	N/A	71.1	0.1%	N/A	3257.5	46.6	N/A
10/28/2022	85.0	0.6%	N/A	71.0	0.0%	N/A	3256.8	46.7	N/A
10/27/2022	84.5	0.0%	N/A	71.0	0.0%	N/A	3258.2	46.9	N/A
10/26/2022	84.4	0.3%	N/A	71.0	0.2%	N/A	3226.3	47.2	N/A
10/25/2022	84.2	0.1%	N/A	70.9	0.4%	N/A	3217.5	47.7	N/A
10/24/2022	84.1	0.1%	N/A	70.6	0.5%	N/A	3205.7	48	N/A

Table 5. STARS model simulations for route-specific entrainment, travel times, and survival.

Date (10/30/2022)	DCC	Georgiana Slough	Sacramento River	Sutter and Steamboat	Interior Delta
Stock: Late Fall Run	N/A	N/A	N/A	N/A	N/A
Proportion of Entrainment	0	0.31	0.44	0.24	N/A
Survival	N/A	0.16	0.48	0.35	N/A
Travel Time	N/A	18.7d	11.5d	12.0d	N/A
Stock: Winter Run	N/A	N/A	N/A	N/A	N/A
Proportion of Entrainment	N/A	N/A	0.58	0.14, 0.15	0.14
Survival	N/A	N/A	0.11	0.21, 0.13	0.03
Travel Time	N/A	N/A	6.5d	6.6d, 6.2d	10.1d

Evaluation

1. How much salmonid loss has occurred in the past week?

No loss of juvenile winter-run Chinook Salmon, spring-run Chinook Salmon, or Steelhead has occurred in the past week at the CVP and SWP fish salvage facilities.

2. Were salmonids observed near the DCC gate in the last seven days?

Juvenile salmonids have not been observed this year near the DCC gates and historical monitoring data indicates that they are not present in the Delta in significant numbers at this time. Closure of the DCC gates would reduce likelihood of entraining juvenile salmonids into the Interior Delta.

3. Given forecasted conditions and observations of salmonids, what are the effects of DCC gate operations on salmonids in the next seven days?

It is unlikely juvenile winter-run Chinook Salmon are present near the DCC gates. Closure of the gates would positively impact any present juvenile salmonids by preventing entrainment into the interior Delta. Closure of the DCC gates, also reduces straying of Mokelumne River adult fall-run Chinook salmon during the fall attraction flow releases.

Biology, Distribution, and Evaluation of Delta Smelt

Population Status

- Delta Smelt Life Stages:
 - Subadults and adults
- Brood Year 2022:
- Abundance estimate:
 - No abundance estimate has been calculated in WY2023 so far. The most recent detection of Delta Smelt was on 9/21/2022 in Suisun Marsh (Grizzly Bay).
- Biological Conditions:
 - Adult and subadult Delta Smelt expected to be present in the Sacramento Deep Water Shipping Channel and downstream of the confluence of the Sacramento and San Joaquin rivers. The Smelt Monitoring Team discussed the most recent monitoring data (Table 4) and considered professional opinion on the historical trends in regional distribution.

Distribution

Current Distribution

- Real time detection data is currently limited to EDSM sampling and Chipps Island; Bay Study and FMWT provide data as available.
- Since there are few recent detections of Delta Smelt, the Smelt Monitoring Team's capacity to estimate where they are within the Delta is limited.
- The last Delta Smelt detection was on 9/21/2022 in Grizzly Bay.
- Larval sampling at the Skinner Fish Facility (SFF) and the Tracy Fish Collection Facility (TFCF) will be initiated by the SMT in February.
- COA 8.5.2: No larval or juvenile Delta Smelt have been salvaged at the SFF or TFCF as of 11/01/2022 (Table 7).

Table 6. Summary of newly reported detections of Delta Smelt by Region and Salvage Facilities between 10/25/2022 and 11/1/2022. Regions are those defined by EDSM sampling. Delta Smelt >58mm FL are considered adults. Subadult fish are considered by the SMT to be fish from the previous year’s cohort based on size and timing of collection. Young of year are considered juveniles and larvae.

Life Stage	North	South	West	Far West	Salvage
Adult	0	0	0	0	0
Subadult	0	0	0	0	0
Larvae/Juvenile	0	0	0	0	0

Table 7. Summary of recent Delta Smelt detections reported since last assessment and the total detections for the current water year. Notes reflect latest information on reported detections or completion of survey for the water year and include both larval and adult detections. Total Fish counts do not distinguish between hatchery origin and wild Delta Smelt. Table may include preliminary data that may not have received full QA/QC, but any corrections will be made the following week.

Sampling Method	Frequency	New Detections	WY2023	Notes
EDSM	Weekly	0	0	Phase 3 began 7/5/22
SKT	Monthly	0	0	Begins:
SLS	Biweekly	0	0	Begins: 12/5/2022
20-mm	Biweekly	0	0	Begins:
Summer Townet	Biweekly	0	0	Begins:
Bay Study	Monthly	0	0	Ongoing
FMWT	Monthly	0	0	Ongoing
Chipps Island Trawl	Weekly	0	0	Ongoing
FCCL Brood Stock Collections	Weekly	0	0	N/A
LEPS	As available	0	0	Begins:
TFCF	Daily	0	0	Ongoing
FRP	Daily	0	0	Ongoing

Sampling Method	Frequency	New Detections	WY2023	Notes
Total	N/A	N/A	0	Sum of all Delta Smelt observed during the OMR Management Season

Cultured Delta Smelt Experimental Releases

Experimental releases are planned for the week of November 28 and two release events in January (weeks of the 9th and 23rd). A total of approximately 42,000 fish are expected to be released this water year.

Table 8. Weekly summary of the origin of Delta Smelt. These identifications are considered tentative and additional genetic testing will confirm the identity of individuals. Individuals with no tags are provided alive to the FCCL as potential additions to the FCCL Broodstock.

Date	Survey	Stratum/Station	Total Caught	Ad. Clipped	VIE	No Tag
N/A	N/A	N/A	N/A	N/A	N/A	N/A

Historical Trends

- In November historical patterns observed the centroid of the population close to the X2 position (Sommer et al 2011).
- Upstream migration for Delta Smelt occurs between September and December (Sommer et al. 2011).
- Delta Smelt detections in the Sacramento Deep Water Ship Channel indicate presence upstream of the confluence but may be freshwater residents and not representative of the migratory life history patterns in Delta Smelt (Hobbs 2019).
- Historically, the highest peak in salvage is in May and the second highest is in June (Grimaldo et al 2009; figure 5).

Forecasted Distribution within Central Valley and Delta regions

- Predicting the distribution of subadult Delta Smelt is currently difficult because detection data is limited to a few individuals and historic patterns may not be representative of the low population levels. No detections have been in the central or south delta.
- The SMT uses turbidity as a surrogate for Delta Smelt presence and in making assessments of the likelihood of entrainment for larval Delta Smelt after spawning begins.

- The potential of experimentally released Delta Smelt to distribute from their release site is unknown at this time and SMT cannot predict their distribution beyond the original release site and subsequent recaptures.

Abiotic Conditions

Turbidity

- First Flush Conditions can be triggered between Dec. 1st and January 31st. Precipitation up to a half an inch is expected on 11/1. On 11/1, South winds between 13-23 mph will turn into West winds in the afternoon. Gusts could reach 30 mph. At night, SW winds range between 17-22 mph, gusting as high as 29 mph. SW winds > 20 mph may stir up south Delta turbidity. West winds tomorrow, 10-14 mph with gusts to 18 mph, and gusts to 24 mph. There is also a slight chance of rain on 11/2 and 11/5-11/7.
- As of 11/1/2022 turbidity continues to be less than 12 FNU at OBI and is stable at other central and south Delta stations. However, the expected precipitation this week will likely increase turbidity in the Delta over the next seven days.
- South Delta Turbidity is expected to increase, but due to seasonal timing the turbidity change is not expected to influence the distribution of Delta Smelt and the likelihood of entraining Delta Smelt in the next seven days.

Table 9. Relevant Environmental Factors to the current management actions for Delta Smelt.

Date Reported	FPT 3-day Running Average Flow (cfs)	FPT 3-day Running Average Turbidity (FNU)
10/31/2022	7148.86	1.87

X2 Conditions

- X2 is estimated to be at 96.2 km as of 10/28/22. The EC sensor at RVB has not been reporting since then. The X2 estimated at SJ for 10/31/2022 is 96.1.
- When X2 is above 81 km, the SMT uses the X2_EC_Graph.xlsx tool to estimate the position of X2 for both the Sacramento and San Joaquin Rivers and assumes the average of the two is representative of an approximate X2 position.

Other Environmental Conditions

- The Fish and Water Operation Outlook OMR Index values are expected to range between -1000 to -2000 cfs from 11/1/2022 to 11/7/2022.
- Real time tracking of environmental conditions, relevant thresholds and Delta Smelt catch data are updated daily at:
http://www.cbr.washington.edu/sacramento/workgroups/delta_smelt.html.

Evaluation

1. Between December 1 and January 31, has any first flush condition been exceeded?

The question is not applicable until Dec. 1st

2. Do DSM have a high risk of migration and dispersal into areas at high risk of future entrainment? (December 1- January 31)

The question is not applicable until Dec. 1st

3. Has a spent female been collected?

This question is not applicable until Turbidity Bridge Avoidance begins.

4. If OMR of -2000 cfs does not reduce OBI turbidity below 12NTU/FNU, what OMR target is deemed protective between -2000 and -5000 cfs?

This question is not applicable until Turbidity Bridge Avoidance begins.

5. If OBI is 12 NTU/FNU, what do other station locations show?

OBI turbidity is currently below 12 FNU. The daily average turbidities on 10/31/2022 at Prisoners Point (2.88 NTU), Holland Cut (2.09 FNU) and Victoria Canal (1.59 NTU) are expected to remain stable over the next seven days.

6. If OBI is 12 NTU/FNU, is a turbidity bridge avoidance action not warranted? What is the supporting information?

This question is not applicable until Turbidity Bridge Avoidance begins.

7. After March 15 and if QWEST is negative, are larval or juvenile DSM within the entrainment zone of the CVP and SWP pumps based on surveys?

This question is not applicable until March 15th.

8. Based on real-time spatial distribution of Delta Smelt and currently available turbidity information, should OMR be managed to no more negative than -3,500?

This question is not applicable until March 15th.

9. What do hydrodynamic models, informed by EDSM or other relevant data, suggest the estimated percentage of larval and juvenile DSM that could be entrained may be?

This question is not applicable until March 15th.

Delta Smelt References

- Damon, L. J., S. B. Slater, R. D. Baxter, and R. W. Fujimura. 2016. Fecundity and reproductive potential of wild female Delta smelt in the upper San Francisco Estuary, California. *California Fish and Game* 102(4):188–210.
- Hobbs, J. A., Lewis, L. S., Willmes, M., Denney, C., & Bush, E. (2019). Complex life histories discovered in a critically endangered fish. *Scientific Reports*, 9(1). <https://doi.org/10.1038/s41598-019-52273-8>
- Lenny F. Grimaldo, Ted Sommer, Nick Van Ark, Gardner Jones, Erika Holland, Peter B. Moyle, Bruce Herbold & Pete Smith (2009) Factors Affecting Fish Entrainment into Massive Water Diversions in a Tidal Freshwater Estuary: Can Fish Losses be Managed? *North American Journal of Fisheries Management*, 29:5, 1253-1270, DOI: 10.1577/M08-062.1
- Polansky, L., Newman, K.B., Nobriga, M.L. et al. Spatiotemporal Models of an Estuarine Fish Species to Identify Patterns and Factors Impacting Their Distribution and Abundance. *Estuaries and Coasts* 41, 572–581 (2018). <https://doi.org/10.1007/s12237-017-0277-3>
- Sommer, T., F. Mejia, M. Nobriga, and L. Grimaldo. 2011. The Spawning Migration of Delta Smelt in the Upper San Francisco Estuary. *San Francisco Estuary and Watershed Science* 9(2).

Attachment A. - Mokelumne River Pulse Flow Plan

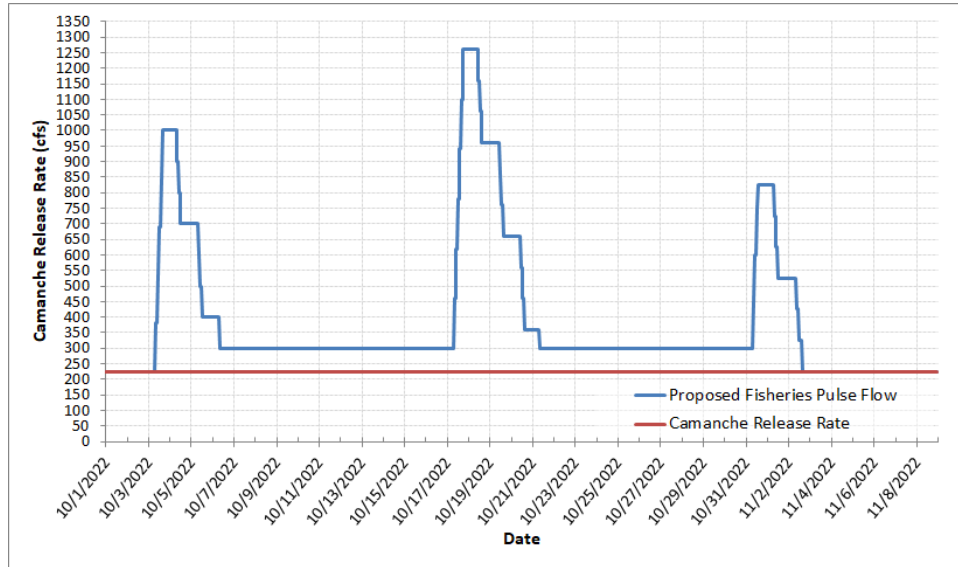


Figure A1. October 2022 Mokelumne River Pulse Flow plan (source: 2022 Camanche Pulse Flow Plan_Schedule; tab: Pulse Flow – Hourly INPUT)

Table A1. October 2022 Mokelumne River Pulse Flows Accounting (source: 2021 Camanche Pulse Flow Plan_Schedule; tab: Pulse Flow Accounting)

Date	JSA Minimum Release (cfs)	INPUT - Base Flow - JSA Min + Buffer (cfs)	Add. Pulse Flow (cfs)	Total Release (cfs)	Daily Release Volume (AF)	Cumulative Release Volume (AF)	Add. Pulse Flow (AF)
10/1/22	220	225	0	225	446	446	N/A
10/2/22	220	225	0	225	446	893	N/A
10/3/22	220	225	388	613	1,215	2,107	769
10/4/22	220	225	600	825	1,636	3,744	1190
10/5/22	220	225	300	525	1,041	4,785	595
10/6/22	220	225	108	333	661	5,446	215
10/7/22	220	225	75	300	595	6,041	149
10/8/22	220	225	75	300	595	6,636	149
10/9/22	220	225	75	300	595	7,231	149
10/10/22	220	225	75	300	595	7,826	149
10/11/22	220	225	75	300	595	8,421	149
10/12/22	220	225	75	300	595	9,017	149

Date	JSA Minimum Release (cfs)	INPUT - Base Flow - JSA Min + Buffer (cfs)	Add. Pulse Flow (cfs)	Total Release (cfs)	Daily Release Volume (AF)	Cumulative Release Volume (AF)	Add. Pulse Flow (AF)
10/13/22	220	225	75	300	595	9,612	149
10/14/22	220	225	75	300	595	10,207	149
10/15/22	220	225	75	300	595	10,802	149
10/16/22	220	225	75	300	595	11,397	149
10/17/22	220	225	515	740	1,468	12,864	1021
10/18/22	220	225	898	1,123	2,226	15,091	1780
10/19/22	220	225	598	823	1,631	16,722	1185
10/20/22	220	225	298	523	1,036	17,759	590
10/21/22	220	225	95	320	635	18,393	188
10/22/22	220	225	75	300	595	18,988	149
10/23/22	220	225	75	300	595	19,583	149
10/24/22	220	225	75	300	595	20,179	149
10/25/22	220	225	75	300	595	20,774	149
10/26/22	220	225	75	300	595	21,369	149
10/27/22	220	225	75	300	595	21,964	149
10/28/22	220	225	75	300	595	22,559	149
10/29/22	220	225	75	300	595	23,154	149
10/30/22	220	225	75	300	595	23,749	149
10/31/22	220	225	369	594	1,178	24,926	731
11/1/22	220	225	425	650	1,289	26,216	843
11/2/22	220	225	146	371	736	26,951	289
11/3/22	220	225	0	225	446	27,398	N/A
11/4/22	220	225	0	225	446	27,844	N/A
11/5/22	220	225	0	225	446	28,290	N/A
11/6/22	220	225	0	225	446	28,736	N/A
11/7/22	220	225	0	225	446	29,183	N/A
11/8/22	220	225	0	225	446	29,629	N/A