

# **Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh**

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## **Chapter 5 Estimating Net Delta Outflow, Summary of March 2016 Report to the State Water Resources Control Board**

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## Contents

5	Estimating Net Delta Outflow, Summary of March 2016 Report to the State Water Resources Control Board.....	5-1
5.1	INTRODUCTION .....	5-1
5.2	SUMMARY .....	5-1
5.3	RECOMMENDATIONS .....	5-1
5.4	REFERENCES .....	5-2



## 5 Estimating Net Delta Outflow, Summary of March 2016 Report to the State Water Resources Control Board

### 5.1 Introduction

In fall 2015, the State Water Resources Control Board (SWRCB) requested that the California Department of Water Resources (DWR) provide technical guidance on the best available consumptive use models and, more broadly, on the subject of Net Delta Outflow calculations. DWR produced a report, titled *On Estimating Net Delta Outflow (NDO), Approaches to Estimating NDO in the Sacramento-San Joaquin Delta* (California Department of Water Resources 2016) and submitted it to the SWRCB in March 2016. This chapter is a brief outline and a summary of the report.

### 5.2 Summary

The first section of the report defines Net Delta Outflow (NDO) and the Net Delta Outflow Index (NDOI). The second section of the report describes various consumptive-use estimates including DAYFLOW, Delta Island Consumptive Use (DICU), and Delta Evapotranspiration of Applied Water (DETAW). DAYFLOW is a computer program designed to estimate the daily average NDOI. In order to determine NDOI, calculations of channel depletions are necessary for the estimate (see <http://www.water.ca.gov/dayflow/>). This consumptive-use section also addresses possible effects of groundwater and channel depletions and presents land-use data. The third section of the report addresses the difficulties and progress in measuring direct flows at various stations for determining outflow. The fourth section discusses using salinity at Martinez to determine outflow, which is a salinity inversion method. The fifth section describes recent activities in gathering data and information on consumptive use and suggests areas for additional data collection and modeling of groundwater interaction. This section also discusses the addition of increased instrumentation to measure flows to aid in quantifying net channel depletions.

### 5.3 Recommendations

The following are the report's key recommendations

- At this point in time, an NDOI-like water balance remains the best choice as an indicator of Net Delta Outflow, but should be updated to incorporate improvements in consumptive-use estimates and to correct a few known accounting errors, such as the inflow from Yolo Bypass during summer.
- The monthly DICU model represents our most mature consumptive-use estimate. It was the in-progress effort mentioned in the SWRCB Water Right Decision 16411 and has been established in planning and modeling practice throughout the Bay-Delta modeling community for many years. Much work has been done in recent years to replace DICU with a daily model, which is DETAW. DETAW includes shorter time scales and better soil moisture accounting. DETAW, a consumptive-use model, is now completed. Still, to estimate net channel depletions, which have a more direct impact on outflow estimates for factors, such as groundwater use, these factors must be incorporated in the calculations along with DETAW amounts. As a result, this model and its post-processed net channel depletions have not been officially released, in part, because of some uncertainties over the contributions of seepage from channels and groundwater uptake. Input, development, and acceptance of certain groundwater assumptions are needed from a wider group of groundwater experts before this model can be officially released.

- The 4-station (Rio Vista, Jersey Point, Dutch Slough, Threemile Slough) direct measurement approach to outflow is inaccurate and should not be used to calculate NDO or to corroborate NDOI. This recommendation is based on the lack of accuracy in the results and the nature of the approach.
- DWR and other institutions should continue to perform more measurements, field studies, and investigations to refine estimates.

## 5.4 References

California Department of Water Resources. 2016. *On Estimating Net Delta Outflow (NDO), Approaches to Estimating NDO in the Sacramento-San Joaquin Delta*. Sacramento (CA): Delta Modeling Section. Bay-Delta Office. California Department of Water Resources.