California's Regional Haze Progress Report for the Second Implementation Period

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1. Introduction

Section 169A of the federal Clean Air Act (CAA) "declares as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I federal areas which impairment results from manmade air pollution." The CAA directed the U.S. Environmental Protection Agency (EPA) to promulgate regulations aimed at meeting the goals of Section 169A. To this end, EPA originally finalized the Regional Haze Rule in 1999. The Regional Haze Rule was amended and revised in 2005 and 2017 and is codified under 40 CFR 51.300-51.309.

Nationwide, there are 156 mandatory Class I federal areas (Class I areas), which include a host of both iconic and lesser-known national parks and wilderness areas where visibility was identified as an important value during the initial promulgation of rules and regulations that serve as the cornerstone of the regional haze program.

The overarching goal of the regional haze program is to achieve natural visibility conditions in Class I areas by 2064. Under the Regional Haze Rule, states are required to submit two types of regional haze planning documents: regional haze state implementation plans (SIPs) and progress reports. SIPs cover a 10-year planning period and progress reports are typically submitted at the mid-point of each planning period.

CARB has submitted two Regional Haze SIPs to EPA covering two 10-year planning periods. The first California Regional Haze SIP was adopted by CARB on January 22, 2009, submitted to EPA on March 16, 2009, and approved by EPA on June 14, 2011. The second California Regional Haze SIP covering the second planning period was adopted by CARB on June 24, 2022, and submitted to EPA on August 8, 2022.

This document serves as a progress report for the second regional haze planning period, which covers the period from 2018 to 2028, and is intended to fulfill the requirements of paragraphs 51.308(g), (h), and (i) of the Regional Haze Rule. In this progress report, California affirms that its Regional Haze SIP for the second planning period is adequate for making reasonable progress towards the goal of achieving natural visibility conditions.

Regional haze planning is a collaborative effort. California is a member of the Western Regional Air Partnership (WRAP), a voluntary partnership of states, tribes, federal land managers, local air agencies, and EPA. Of the 156 Class I areas protected under the regional haze program, 118 are in the jurisdiction of WRAP's member states. California has 29 Class I areas, more than any other state. WRAP provides technical assistance, facilitates discussion, and encourages coordinated action among its member agencies. It also fosters communication with other regional planning organizations engaged in planning activities related to regional haze.

The following sections detail the statutory requirements for the progress report and provide information responsive to each of the requirements. California has consulted with Federal Land Managers (FLM) on the contents of this progress report and has made it available for

public review prior to submittal to EPA. Per revisions made to the Regional Haze Rule in 2017 (82 FR 3078), this progress report is not being submitted as a formal SIP revision.

2. Status of Control Strategies in the Regional Haze SIP

Statutory Requirements

Section 51.308(g)(1) requires "[a] description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for mandatory Class I Federal areas both within and outside the state."

For the first planning period, measures in California's long-term strategy consisted of already-adopted CARB control measures for mobile sources and consumer products. The measures identified in the round-one SIP[1] have been fully implemented. The round-one SIP also required Best Available Retrofit Technology (BART) for the main stack at the Valero Refinery in Benicia, California. New control equipment was installed and operating by February 2011, prior to the 2013 compliance deadline. As reported in the first-round progress report, improved emission controls for the main stack achieved reductions of 0.65 tons per day (tpd) of oxides of nitrogen (NOx), 15.7 tpd oxides of sulfur (SOx), and 0.06 tpd of particulate matter (PM10).

For the second planning period, California's long-term strategy included additional measure beyond the already-adopted CARB control measures for mobile sources for making reasonable progress as outlined in California's Regional Haze Plan for the Second Implementation Period. These measures are:

- Heavy-Duty Omnibus Regulation;
- Advanced Clean Trucks (also known as the Last Mile Delivery Measure);
- Heavy-Duty Vehicle Inspection and Maintenance Program; and
- Advanced Clean Cars II.

These measures are part of CARB's aggressive strategy for reducing NOx emissions from on-road mobile sources in California. In the second-round Regional Haze SIP, California committed to achieving a total aggregate emissions reduction of 40 tpd of NOx by 2028 through the adoption and implementation of these measures.

The California Office of Administrative Law approved the Heavy-Duty Omnibus Regulation and filed the regulation order with the California Secretary of State on December 22, 2021. CARB submitted a request for waiver and authorization on January 31, 2022, to EPA pursuant to CAA Section 209. The waiver and authorization request is still pending EPA action. The regulatory and rulemaking documents as well as the waiver and authorization request are available on the Heavy-Duty Omnibus Regulation page of CARB's website.[2] The Heavy-Duty Omnibus Regulation's requirements began with the 2024 model year.

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[1] *https://ww2.arb.ca.gov/sites/default/files/2024-08/2014ProgressReport.pdf* (see Table 1)

[2] *https://ww2.arb.ca.gov/rulemaking/2020/hdomnibuslownox*

The California Office of Administrative Law approved the Advanced Clean Trucks Regulation and filed the regulation order with the California Secretary of State on March 15, 2021. Pursuant to CAA Section 209, EPA granted CARB's request for a waiver of preemption on April 6, 2023.[3] The regulation and rulemaking documents are available on the Advanced Clean Trucks Regulation page of CARB's website.[4] CARB began implementation of the Advanced Clean Trucks Regulation in 2024.

The California Office of Administrative Law approved the Heavy-Duty Inspection and Maintenance Regulation and filed the regulation order with the California Secretary of State on October 5, 2022. The regulation became effective January 1, 2023. The regulation and rulemaking documents are available on the Heavy-Duty Inspection and Maintenance Regulation page of CARB's website.[5] CARB began implementation of the Heavy-Duty Inspection and Maintenance Regulation in 2023.

The California Office of Administrative Law approved the Advanced Clean Cars II Regulation and filed the regulation order with the California Secretary of State on November 30, 2022. The regulation and rulemaking documents are available on the Advanced Clean Cars II page of CARB's website.[6] CARB submitted a request for waiver of preemption on May 22, 2023, to EPA pursuant to CAA Section 209. EPA held a public hearing on January 10, 2024, and accepted public comments (Docket ID No. EPA–HQ–OAR–2023–0292) from December 26, 2023, to February 27, 2024, regarding the waiver request. The waiver request is still pending EPA action. The Advanced Clean Cars II Regulation starts implementation with the 2026 model year.

CARB has adopted the measures committed to in the Regional Haze SIP. As implementation continues for the three engine standard regulations, each year, more vehicles meeting the requirements will be part of the California fleet.

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[3] *https://www.govinfo.gov/content/pkg/FR-2023-04-06/pdf/2023-07184.pdf*
[4] *https://ww2.arb.ca.gov/rulemaking/2019/advancedcleantrucks*
[5] *https://ww2.arb.ca.gov/rulemaking/2021/hdim2021*
[6] *https://ww2.arb.ca.gov/rulemaking/2022/advanced-clean-cars-ii*

3. Emissions Reductions from Regional Haze SIP Strategies

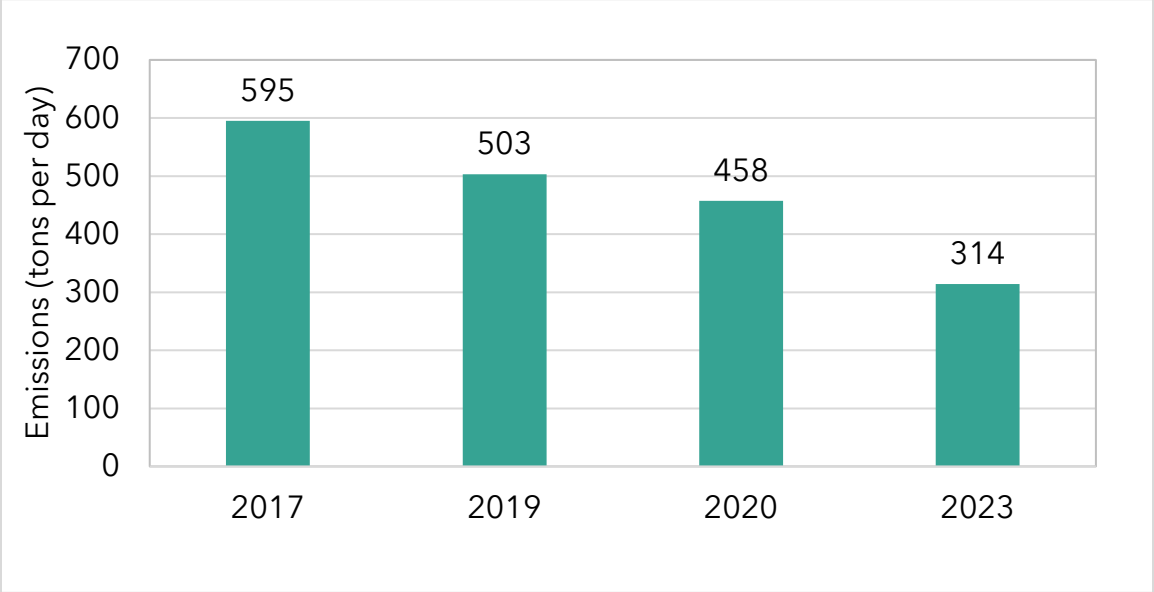
Statutory Requirements

Section 51.308(g)(2) requires "[a] summary of the emissions reductions achieved throughout the state through the implementation of the measures described in paragraph (g)(1) of this section."

As discussed in the second-round regional haze SIP, ammonium nitrate is generally the dominant visibility-impairing PM species attributable to U.S. sources in California Class I areas and is the focus of California's regional haze planning efforts. NOx is considered the limiting precursor for ammonium nitrate formation. California's regional haze long-term strategy is focused on ensuring that reasonable controls are in place for the major sectors that emit NOx emissions. The strategy in California's second-round regional haze SIP focused on reducing NOx emissions from on-road mobile sources through the adoption and implementation of the four measures discussed in the previous section.

Ongoing implementation of CARB's comprehensive mobile source control strategy has achieved substantial reductions in NOx emissions from on-road mobile sources. Statewide, NOx emissions have decreased by 47%, from 595 tpd in 2017 to 314 tpd in 2023, as shown in Figure 1.

Figure 1: Statewide NOx Emissions from On-Road Motor Vehicles



Data Source: CEPAM California 2022 Ozone SIP Baseline Emissions Projection version 1.01B
NOx Emissions shown are determined based on the annual average, grown and controlled with no external adjustments

Estimated emission reductions through 2023 attributable to each of the four regulations in the regional haze long-term strategy are summarized in Table 1 below. Of the four regulations, only the Heavy-Duty Vehicle Inspection and Maintenance Program regulation

had started implementation in 2023. Table 1 also shows each regulation's estimated emission reductions expected in 2023 and 2028, as given in the second-round Regional Haze SIP.

Table 1: NOx Emission Reductions from Strategies in the Second-Round SIP

Emission Control Measure	Estimated NOx Emission Reductions Achieved in 2023	Estimated NOx Emission Reductions Expected in 2028
Heavy-Duty Omnibus	0 tpd	9 tpd
Advanced Clean Trucks	0 tpd	2 tpd
Heavy-Duty Vehicle Inspection and Maintenance Program	6.4 tpd	28 tpd
Advanced Clean Cars II	0 tpd	1 tpd

While only the Heavy-Duty Vehicle Inspection and Maintenance Program began the initial phase of implementation in 2023, two of the regulations began implementation in 2024 and the third will begin implementation with the 2026 model year. Further, more requirements reducing emission will be phased in through 2025 for the Heavy-Duty Vehicle Inspection and Maintenance Program. As these regulations with new emission standards get implemented, each year more vehicles meeting these standards will be part of the California fleet. These upcoming implementation deadlines for each regulation ensures the anticipated emission reductions will occur timely by 2028.

4. Visibility Progress

Current (2018-2022) Visibility Conditions

Statutory Requirements

Section 51.308(g)(3) requires that, "[f]or each mandatory Class I Federal area within the State, the State must assess the following visibility conditions and changes, with values for most impaired, least impaired and/or clearest days as applicable expressed in terms of 5-year averages of these annual values. The period for calculating current visibility conditions is the most recent 5-year period preceding the required date of the progress report for which data are available as of a date 6 months preceding the required data of the progress report."

Section 51.308(g)(3)(i)(B) applies to progress reports due on and after January 31, 2025, and requires reporting of, "the current visibility conditions for the most impaired and clearest days."

California relies on data from 17 monitoring sites operated by the Interagency Monitoring of PROtected Visual Environments (IMPROVE) Network to track visibility conditions in California's Class I areas. Filter analysis from each of the IMPROVE sampler modules yields a large amount of data, including mass of visibility-reducing PM species (measured in units of micrograms per cubic meter, or ug/m3), that are used in determining visibility conditions.

As detailed in the notes below Tables 2 through 4, data completeness issues have affected the calculation of regional haze statistics for the 2018-2022 time period. To help address these issues, CARB has worked closely with our partners at the U.S. Forest Service and conducted outreach to Forest Supervisors who support the operation of numerous IMPROVE sites in California. The outreach has been focused on emphasizing the ongoing utility of the data from sites in the IMPROVE network and the importance of a complete data record for effective regional haze planning.

As discussed further in Section 6 (Assessment of Changes Impeding Visibility Progress) below, the 2018-2022 time period was uniquely impacted by wildfires which may have affected visibility conditions. Major wildfires generated large amounts of smoke that were transported throughout a significant portion of the State, including into Class I areas. The data in the tables below reflect some wildfire impacts.

At Class I areas in Northern California, current visibility conditions on the most impaired days range from 15.2 deciviews (dv) at the Point Reyes National Seashore to 8.6 dv in the Desolation and Mokelumne Wilderness Areas (Table 2). On the clearest days, visibility conditions range from 8.4 dv at the Point Reyes National Seashore to 1.6 dv in the Desolation and Mokelumne Wilderness Areas.

Table 2: Current (2018-2022) Visibility Conditions in Northern California

IMPROVE MONITORING SITE Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
LABE1 Lava Beds National Monument South Warner Wilderness	9.2*	2.7*
REDW1 Redwood National Park	12.1	5.5
TRIN1 Marble Mountain Wilderness Yolla Bolly-Middle Eel Wilderness	10.6**	2.6**
LAVO1 Caribou Wilderness Lassen Volcanic National Park Thousand Lakes Wilderness	9.9	2.3
BLIS1 and BLIS2 Desolation Wilderness Mokelumne Wilderness	8.6***	1.6***
PORE1 Point Reyes National Seashore	15.2	8.4
YOSE1 Emigrant Wilderness Yosemite National Park	11.6	3.3

*Based on 2018, 2019, and 2022 data. Data from 2020 and 2021 were incomplete.
**Based on 2018-2021 data. Data from 2022 were incomplete.
***Based on 2018 data from BLIS1 and 2020-2022 data from BLIS2. Data from 2019 were incomplete.

As shown in Table 3, current visibility conditions at Class I areas in Central California ranged from 18.2 dv at Kings Canyon and Sequoia National Parks to 7.6 dv in the Hoover Wilderness on the most impaired days. On the clearest days, current visibility impairment ranged from 7.6 dv at Kings Canyon and Sequoia National Parks to 1.3 dv in the Hoover Wilderness Area.

Table 3: Current (2018-2022) Visibility Conditions in Central California

IMPROVE MONITORING SITE Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
HOOV1 Hoover Wilderness	7.6	1.3
KAIS1 Ansel Adams Wilderness John Muir Wilderness Kaiser Wilderness	10.8*	1.5*
PINN1 Pinnacles National Monument Ventana Wilderness	13.6	7.5
SEQU1 Kings Canyon National Park Sequoia National Park	18.2**	7.6**

IMPROVE MONITORING SITE Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
RAFA1 San Rafael Wilderness	14.2*	4.7*

*Based on 2018, 2019, 2021, and 2022 data. Data from 2020 were incomplete.
**Based on 2018, 2019, 2020, and 2022 data. Data from 2021 were incomplete.

At Class I areas in Southern California, current visibility conditions on the most impaired days ranged from 16.4 dv in the Agua Tibia Wilderness Area to 12.7 dv at Joshua Tree National Park (Table 4). On the clearest days, visibility impaired ranged from 7.4 dv in the Agua Tibia Wilderness Area to 2.5 dv in the Cucamonga and San Gabriel Wilderness Areas.

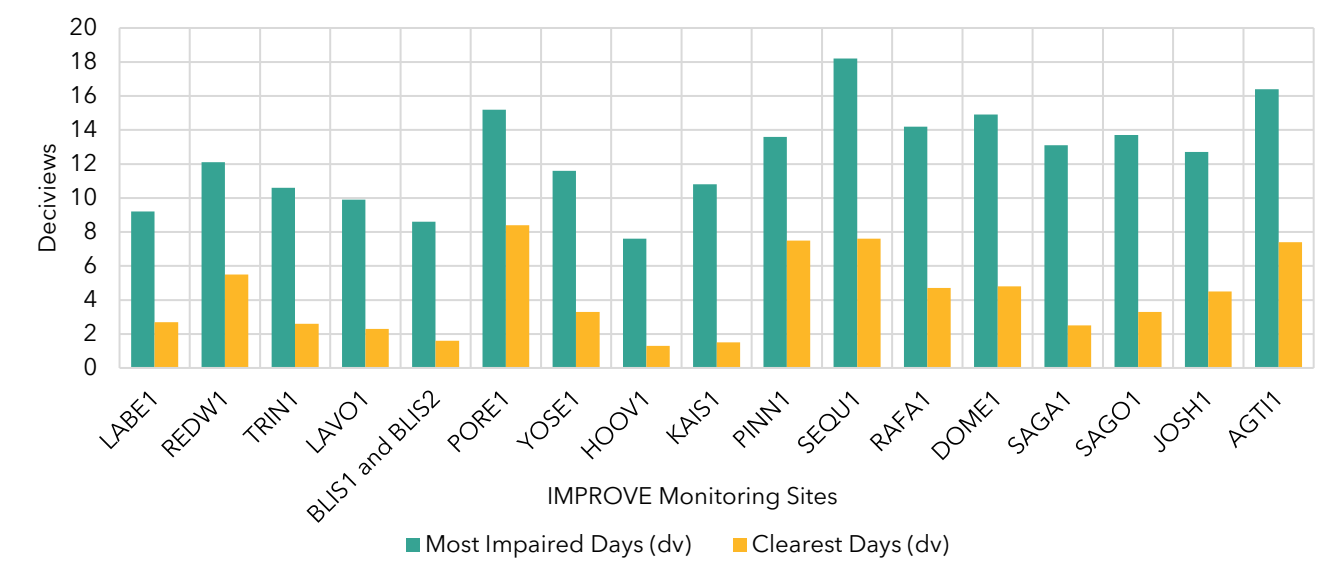
Table 4: Current (2018-2022) Visibility Conditions in Southern California

IMPROVE MONITORING SITE Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
DOME1 Domeland Wilderness	14.9	4.8
SAGA1 Cucamonga Wilderness San Gabriel Wilderness	13.1*	2.5*
SAGO1 San Gorgonio Wilderness San Jacinto Wilderness	13.7	3.3
JOSH1 Joshua Tree National Park	12.7	4.5
AGTI1 Agua Tibia Wilderness	16.4**	7.4**

*Based on data from 2018-2019. Data from 2020-2022 were incomplete.
**This is the 2018 annual average. Data from 2019-2022 were incomplete, so a multi-year average could not be calculated.

Figure 2 visually depicts the data shown above in Tables 2 through 4 from north to south.

Figure 2: Current Visibility Conditions



Difference between Current (2018-2022) and Baseline (2000-2004) Visibility

Additional Statutory Requirements

Section 51.308(g)(3)(ii)(B) applies to progress reports due on and after January 31, 2025, and requires reporting of "the difference between current visibility conditions for the most impaired and clearest days and baseline visibility conditions."

The difference between current visibility conditions (those from the 2018-2022 time-period) and baseline visibility conditions (those from the 2000-2004 time-period) are shown in Tables 5 through 7. Negative values indicate a decrease in visibility impairment—that is, an improvement in average visibility.

For Class I areas in Northern California, visibility impairment on the most impaired days decreased by 1.3 to 4.2 dv. On the clearest days, visibility impairment decreased by 0.1 to 2.1 dv (Table 5). The largest visibility improvement on both the most impaired and clearest days has been at the Point Reyes National Seashore.

Table 5: Difference Between Current Visibility and Baseline Visibility in Northern CA

IMPROVE Monitoring Site Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
LABE1 Lava Beds National Monument South Warner Wilderness	-2.1	-0.5
REDW1 Redwood National Park	-1.6	-0.6
TRIN1 Marble Mountain Wilderness Yolla Bolly-Middle Eel Wilderness	-1.3	-0.8
LAVO1 Caribou Wilderness Lassen Volcanic National Park Thousand Lakes Wilderness	-1.6	-0.4
BLIS1 Desolation Wilderness Mokelumne Wilderness	-1.5	-0.9
PORE1 Point Reyes National Seashore	-4.2	-2.1
YOSE1 Emigrant Wilderness Yosemite National Park	-1.9	-0.1

For Class I areas in Central California, visibility impairment on the most impaired days decreased by 1.3 to 5.0 dv (Table 6). On the clearest days, visibility impairment decreased by 0.1 to 1.8 dv. The largest visibility improvement on the most impaired has been at Kings

Canyon and Sequoia National Parks. The largest visibility improvement on the clearest days has been in the San Rafael Wilderness Area.

Table 6: Difference Between Current Visibility and Baseline Visibility in Central CA

IMPROVE Monitoring Site Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
HOOV1 Hoover Wilderness	-1.3	-0.1
KAIS1 Ansel Adams Wilderness John Muir Wilderness Kaiser Wilderness	-2.1	-0.8
PINN1 Pinnacles National Monument Ventana Wilderness	-3.4	-1.4
SEQU1 Kings Canyon National Park Sequoia National Park	-5.0	-1.2
RAFA1 San Rafael Wilderness	-3.1	-1.8

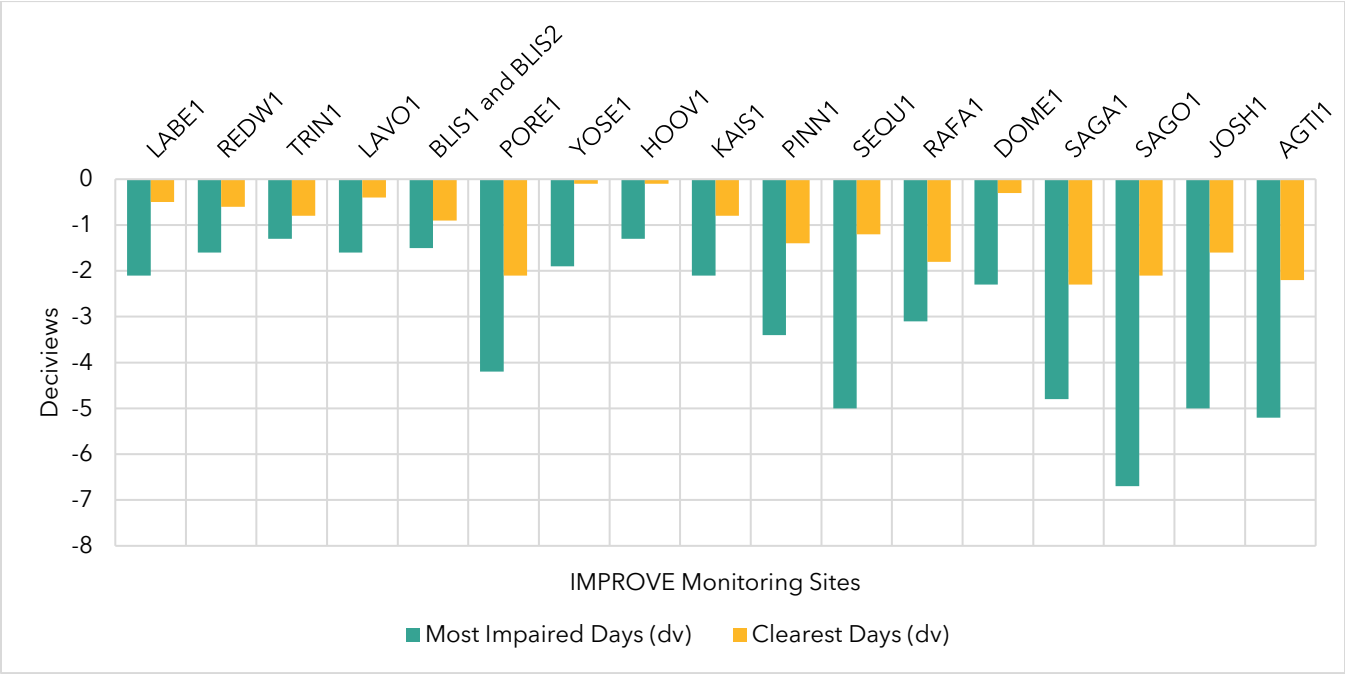
For Class I areas in Southern California, visibility impairment on the most impaired days decreased by 2.3 to 6.7 dv (Table 7). On the clearest days, visibility impairment decreased by 0.3 to 2.3 dv. The largest visibility improvement on the most impaired has been in the San Gorgonio and San Jacinto Wilderness Areas. On the clearest days, the largest visibility improvement has been in the Cucamonga and San Gabriel Wilderness Areas.

Table 7: Difference Between Current Visibility and Baseline Visibility in Southern CA

IMPROVE Monitoring Site Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
DOME1 Domeland Wilderness	-2.3	-0.3
SAGA1 Cucamonga Wilderness San Gabriel Wilderness	-4.8	-2.3
SAGO1 San Gorgonio Wilderness San Jacinto Wilderness	-6.7	-2.1
JOSH1 Joshua Tree National Park	-5.0	-1.6
AGTI1 Agua Tibia Wilderness	-5.2	-2.2

Figure 3 depicts the data shown above in Tables 5 through 7. It is important to note that visibility improved at all sites for both the most impaired and the clearest days.

Figure 3: Difference Between Current Visibility and Baseline Visibility



As impairment decreases, the need for better spatiotemporal resolution of data becomes more apparent. More resolved data are necessary to more accurately determine pollution sources and enable better calibration of the models used for SIP development. Campaigns collecting hourly meteorological and PM data could be helpful.

Change in Impairment between 2014-2018 and 2018-2022

Additional Statutory Requirements

Section 51.308(g)(3)(iii)(B) applies to progress reports due on and after January 31, 2025, and requires reporting of "the change in visibility impairment for the most impaired and clearest days over the period since the period addressed in the most recent plan required under paragraph (f) of this section."

The difference between current visibility conditions, those from the 2018-2022 time-period, and the period addressed in the most recent regional haze SIP, the 2014-2018 time-period, are shown in Tables 8 through 10. Like the tables in the previous section, negative values indicate a decrease in visibility impairment—that is, an improvement in average visibility. The State experienced some of the largest wildfires during the 2018-2022 time-period.

At Class I areas in Northern California, the change in impairment on the most impaired days ranged from an increase in 0.2 dv in the Marble Mountain and Yolla Bolly-Middle Eel Wilderness Areas to a decrease of 0.7 dv in the Desolation and Mokelumne Wilderness

Areas (Table 8). On the clearest days, the change in impairment ranged from an increase of 0.4 dv in the Emigrant Wilderness Area and Yosemite National Park to a decrease of 0.5 dv in the Marble Mountain and Yolla Bolly-Middle Eel Wilderness Areas.

Table 8: Change in Impairment between 2014-2018 and 2018-2022 in Northern CA

IMPROVE Monitoring Site Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
LABE1 Lava Beds National Monument South Warner Wilderness	-0.5	0.2
REDW1 Redwood National Park	-0.5	0.2
TRIN1 Marble Mountain Wilderness Yolla Bolly-Middle Eel Wilderness	0.2	-0.5
LAVO1 Caribou Wilderness Lassen Volcanic National Park Thousand Lakes Wilderness	-0.3	0.1
BLIS1 Desolation Wilderness Mokelumne Wilderness	-0.7	-0.2
PORE1 Point Reyes National Seashore	-0.1	0.2
YOSE1 Emigrant Wilderness Yosemite National Park	0.0	0.4

At Class I areas in Central California, the change in impairment on the most impaired days ranged from an increase in 0.1 dv in the San Rafael Wilderness Area to a decrease of 0.5 dv in Pinnacles National Park and the Ventana Wilderness Area (Table 9). On the clearest days, the change in impairment ranged from an increase of 0.6 dv in Kings Canyon and Sequoia National Parks to a decrease of 0.2 dv in Pinnacles National Park, the Ventana Wilderness Area, and the San Rafael Wilderness Area.

Table 9: Change in Impairment between 2014-2018 and 2018-2022 in Central CA

IMPROVE Monitoring Site Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
HOOV1 Hoover Wilderness	0.0	0.2
KAIS1 Ansel Adams Wilderness John Muir Wilderness Kaiser Wilderness	-0.2	0.0
PINN1 Pinnacles National Park Ventana Wilderness	-0.5	-0.2

IMPROVE Monitoring Site Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
SEQU1 Kings Canyon National Park Sequoia National Park	-0.2	0.6
RAFA1 San Rafael Wilderness	0.1	-0.2

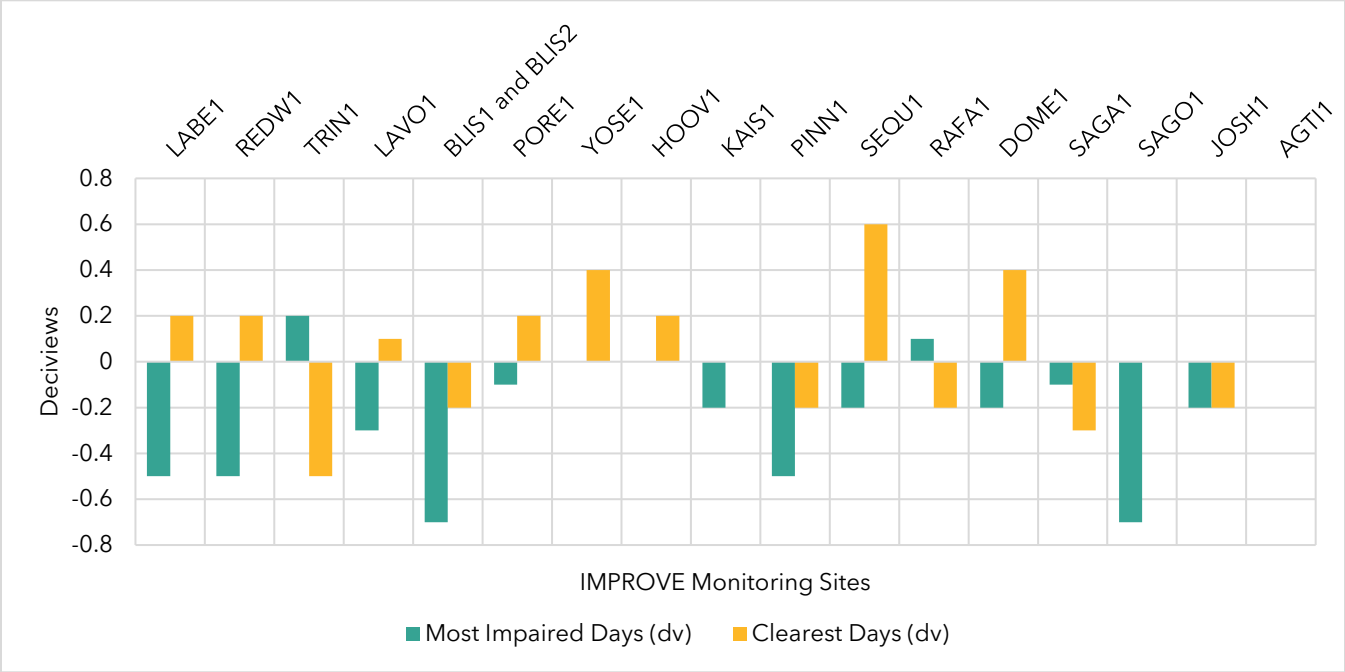
At Class I areas in Southern California, the change in impairment on the most impaired days ranged from a decrease of 0.1 dv in the Cucamonga and San Gabriel Wilderness Areas to a decrease of 0.7 dv in the San Gorgonio and San Jacinto Wilderness Areas (Table 10). On the clearest days, the change in impairment ranged from an increase of 0.4 dv in the Domeland Wilderness Area to a decrease of 0.3 dv in the Cucamonga and San Gabriel Wilderness Areas. Note that for the current period of 2018-2022, 2018 was the only year where complete data were available for Agua Tibia so the difference for this site was not reported in Table 10.

Table 10: Change in Impairment between 2014-2018 and 2018-2022 in Southern CA

IMPROVE Monitoring Site Associated Class I Area(s)	Most Impaired Days (dv)	Clearest Days (dv)
DOME1 Domeland Wilderness	-0.2	0.4
SAGA1 Cucamonga Wilderness San Gabriel Wilderness	-0.1	-0.3
SAGO1 San Gorgonio Wilderness San Jacinto Wilderness	-0.7	0.0
JOSH1 Joshua Tree National Park	-0.2	-0.2
AGTI1 Agua Tibia Wilderness	Difference calculation not relevant due to limited data	Difference calculation not relevant due to limited data

Figure 4 depicts the data shown above in Tables 8 through 10.

Figure 4: Change in Impairment between 2014-2018 and 2018-2022



5. Emissions Progress

Statutory Requirements

Section 51.308(g)(4) requires "[a]n analysis tracking the change over the period since the period addressed in the most recent plan required under paragraph (f) of this section in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes should be identified by type of source or activity. With respect to all sources and activities, the analysis must extend at least through the most recent year for which the state has submitted emission inventory information to the Administrator in compliance with the triennial reporting requirements of subpart A of this part as of a date 6 months preceding the required date of the progress report. With respect to sources that report directly to a centralized emissions data system operated by the Administrator, the analysis must extend through the most recent year for which the Administrator has provided a State-level summary of such reported data or an internet-based tool by which the State may obtain such a summary as of a date 6 months preceding the required date of the progress report."

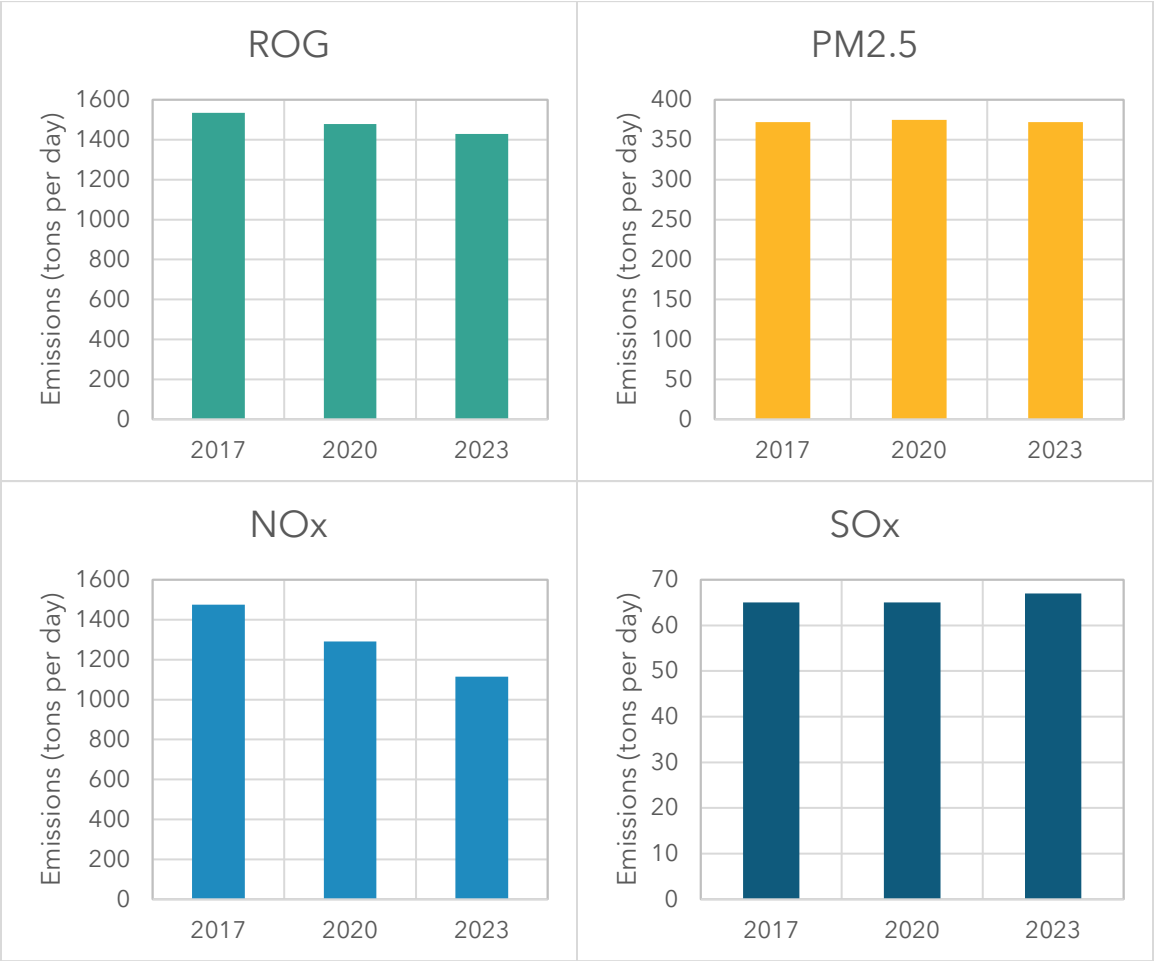
Statewide Emissions Summary

Statewide emissions data were retrieved from the California Emissions Projection Analysis Model (CEPAM) developed for the 2022 Ozone SIP Baseline Emissions Projection version 1.01B. This CEPAM version used a 2018 base year. Data shown are representative of annual average estimates, using emissions that are grown and controlled, and include ocean going vessel emissions for 100 nautical miles from shore. Documentation that further details the development of CARB's emissions estimates are available on the CARB's emissions inventory documentation website.[7] Statewide emissions data are presented in Tables 11 through 14. More detailed emissions data are included in the appendices of this document.

As shown in Figure 5, statewide anthropogenic emissions decreased between 2017 and 2023. The largest emission decreases during this period were in reactive organic gases (ROG) and NOx.

[7] *https://ww2.arb.ca.gov/emission-inventory-documentation*

Figure 5: Statewide Emissions Summary



As shown in Table 11, statewide annual NOx emissions decreased from 1,476 tons per day in 2017 to 1,114 tons per day in 2023. The largest emissions decrease was in the mobile source sector where emissions during this period decreased by nearly 30% due to the implementation of a number of State and federal mobile source control measures. Emissions from the stationary and areawide source sectors also decreased modestly during this period.

Table 11: Statewide Annual NOx Emissions in tons per day

Source Sector Summary Category	2017	2020	2023
Stationary Fuel Combustion	151	151	144
Stationary Waste Disposal	4	4	4
Stationary Cleaning and Surface Coatings	0	0	0
Stationary Petroleum Production & Marketing	4	4	3

Source Sector Summary Category	2017	2020	2023
Stationary Industrial Processes	43	43	44
Total Stationary	**202**	**201**	**195**
Areawide Solvent Evaporation	0	0	0
Areawide Miscellaneous Processes	67	66	63
Total Areawide	**67**	**66**	**63**
Mobile On-Road Motor Vehicle	595	458	314
Mobile Other Mobile Sources	613	566	542
Total Mobile	**1208**	**1024**	**856**
Grand Total for Statewide	**1476**	**1291**	**1114**

As shown in Table 12, statewide emissions of ROG decreased from 1,535 tpd in 2017 to 1,428 tpd in 2023. Similar to NOx, the largest decrease in ROG emissions was from the mobile source sector. During this period, ROG emissions from the stationary source sector also decreased whereas ROG emissions from the areawide source sector increased due to projected growth in solvent evaporation summary category.

Table 12: Statewide Annual Reactive Organic Gas Emissions in tons per day

Source Sector Summary Category	2017	2020	2023
Stationary Fuel Combustion	20	19	19
Stationary Waste Disposal	52	51	52
Stationary Cleaning and Surface Coatings	145	149	154
Stationary Petroleum Production & Marketing	97	88	83
Stationary Industrial Processes	58	57	58
Total Stationary	**371**	**365**	**367**
Areawide Solvent Evaporation	368	390	391
Areawide Miscellaneous Processes	220	221	220
Total Areawide	**588**	**612**	**611**
Mobile On-Road Motor Vehicle	246	195	160

Source Sector Summary Category	2017	2020	2023
Mobile Other Mobile Sources	330	307	290
Total Mobile	**577**	**503**	**450**
Grand Total for Statewide	**1535**	**1479**	**1428**

As shown in Table 13, statewide emissions of SOx remained nearly unchanged between 2017 and 2023. Emissions from the stationary source sector increased slightly due to projected growth in the fuel combustion summary category. Emissions from the areawide and mobile source sectors remained largely unchanged during this period.

Table 13: Statewide Annual Oxides of Sulfur Emissions in tons per day

Source Sector Summary Category	2017	2020	2023
Stationary Fuel Combustion	22	23	23
Stationary Waste Disposal	2	2	2
Stationary Cleaning and Surface Coatings	0	0	0
Stationary Petroleum Production & Marketing	4	4	4
Stationary Industrial Processes	17	17	17
Total Stationary	**44**	**44**	**46**
Areawide Solvent Evaporation	0	0	0
Areawide Miscellaneous Processes	4	4	4
Total Areawide	**4**	**4**	**4**
Mobile On-Road Motor Vehicle	4	4	4
Mobile Other Mobile Sources	13	13	13
Total Mobile	**17**	**17**	**17**
Grand Total for Statewide	**65**	**65**	**67**

Similar to SOx emissions, statewide emissions of directly emitted PM2.5 remained largely unchanged between 2017 and 2023 (Table 14). During this period, emissions from the mobile source sector decreased, but this was offset somewhat by increases in emissions from the areawide source sector. Emissions from the stationary source sector remained nearly unchanged during this period.

Table 14: Statewide Annual PM2.5 Emissions in tons per day

Source Sector Summary Category	2017	2020	2023
Stationary Fuel Combustion	23	22	22
Stationary Waste Disposal	1	1	1
Stationary Cleaning and Surface Coatings	2	2	2
Stationary Petroleum Production & Marketing	3	3	3
Stationary Industrial Processes	29	29	31
Total Stationary	**58**	**58**	**59**
Areawide Solvent Evaporation	0	0	0
Areawide Miscellaneous Processes	252	262	261
Total Areawide	**252**	**262**	**261**
Mobile On-Road Motor Vehicle	31	28	25
Mobile Other Mobile Sources	31	27	26
Total Mobile	**62**	**56**	**51**
Grand Total for Statewide	**372**	**375**	**372**

Facility Emissions Summary from Clean Air Markets Program

Between 2017 and 2023, 115 industrial facilities in California reported to EPA's Clean Air Markets Program. A statewide summary of these emissions data are shown in Table 15. While there was some year-to-year variability in emissions during this period, emissions were fairly stable, averaging 7 to 9 tpd of NOx and 0.4 to 0.5 tpd of SO2.

Table 15: California Emissions Reported to the Clean Air Markets Program

	2017	2018	2019	2020	2021	2022	2023
NOx (tpy)	2,516	2,654	2,405	2,397	3,278	2,647	2,497
NOx (tpd)	7	7	7	7	9	7	7
SO_2 (tpy)	162	164	156	175	186	199	184
SO_2 (tpd)	0.4	0.5	0.4	0.5	0.5	0.5	0.5

6. Assessment of Changes Impeding Visibility Progress

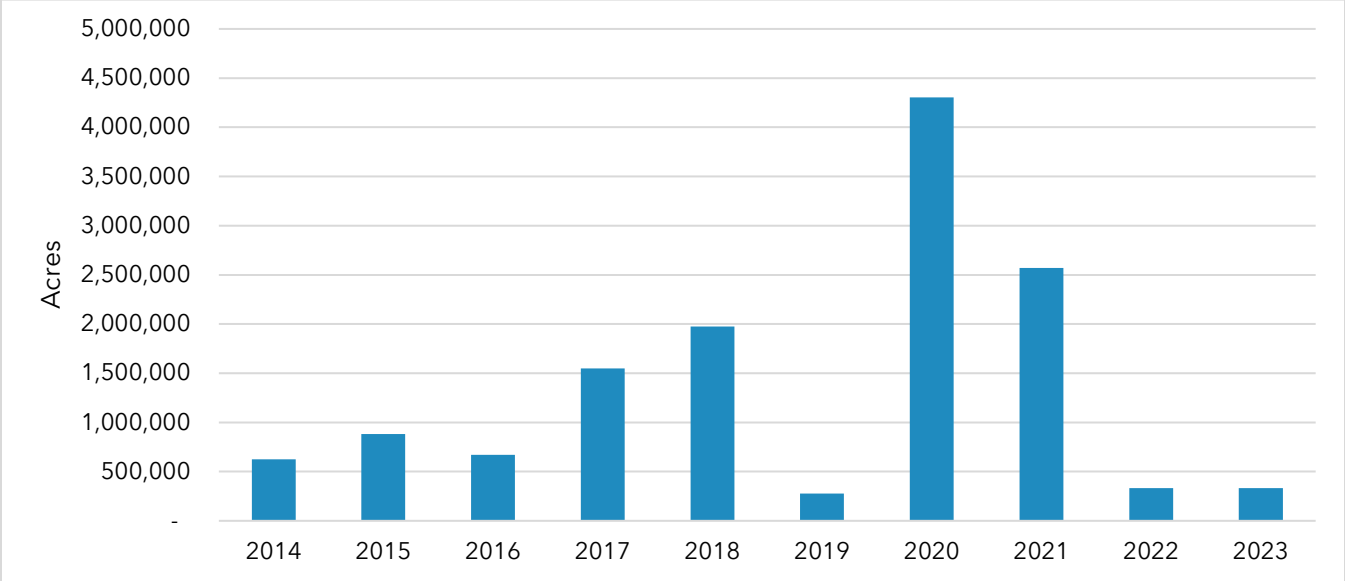
Statutory Requirements

Section 51.308(g)(5) requires, "An assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred since the period addressed in the most recent plan required under paragraph (f) of this section including whether or not these changes in anthropogenic emissions were anticipated in that most recent plan and whether they have limited or impeded progress in reducing pollutant emissions and improving visibility."

As shown in the previous section, statewide anthropogenic emissions have decreased between 2017 and 2023. Wildfire smoke is not an anthropogenic source of emissions. In this relevant planning period, wildfire smoke generated a significant amount of emissions and was an important factor largely beyond State control that could interfere with progress towards improved visibility in Class I areas.

The annual acreage burned by wildfire in California, particularly significant in 2018, 2020, and 2021, is shown below in Figure 6.

Figure 6: Acres Burned by Wildfire in California



Source: *CAL FIRE*

Not only has the total annual acreage of wildfires increased in recent years, the top 8 largest fires in California have all occurred since 2018, as shown in Table 16.

Table 16: Top 8 Largest California Wildfires

Rank	Fire Name	Year	Acres
1	August Complex	2020	1,032,548
2	Dixie	2021	963,309
3	Mendocino Complex	2018	459,123
4	Park Fire	2024	429,603*
5	SCU Lightning Complex	2020	396,625
6	Creek	2020	379,895
7	LNU Lightning Complex	2020	363,220
8	North Complex	2020	318,935

* Number not final
Source: *CAL FIRE*

Many IMPROVE monitors are sited near where these major wildfires took place, as can be seen below in Figure 7. Furthermore, smoke can transport over large distances, impacting monitors far away from the fire location. An example of wildfire smoke transport can be seen below in Figure 8. While the modeling removed some of the wildfire impacts, it did not remove all of the impacts, and the 2018-2022 visibility values were impacted.

Figure 7. Large Fire Boundaries and Locations of IMPROVE Monitors

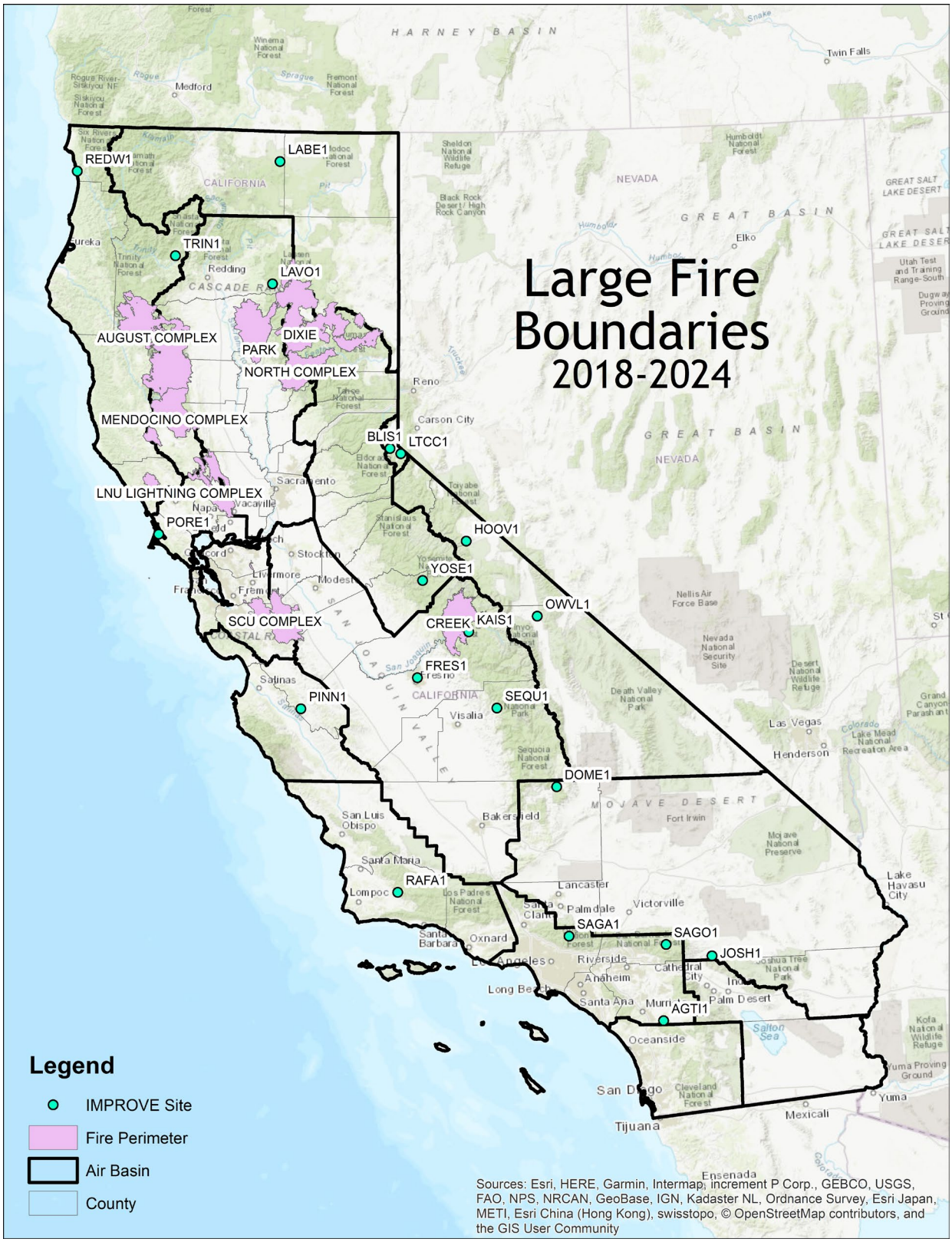
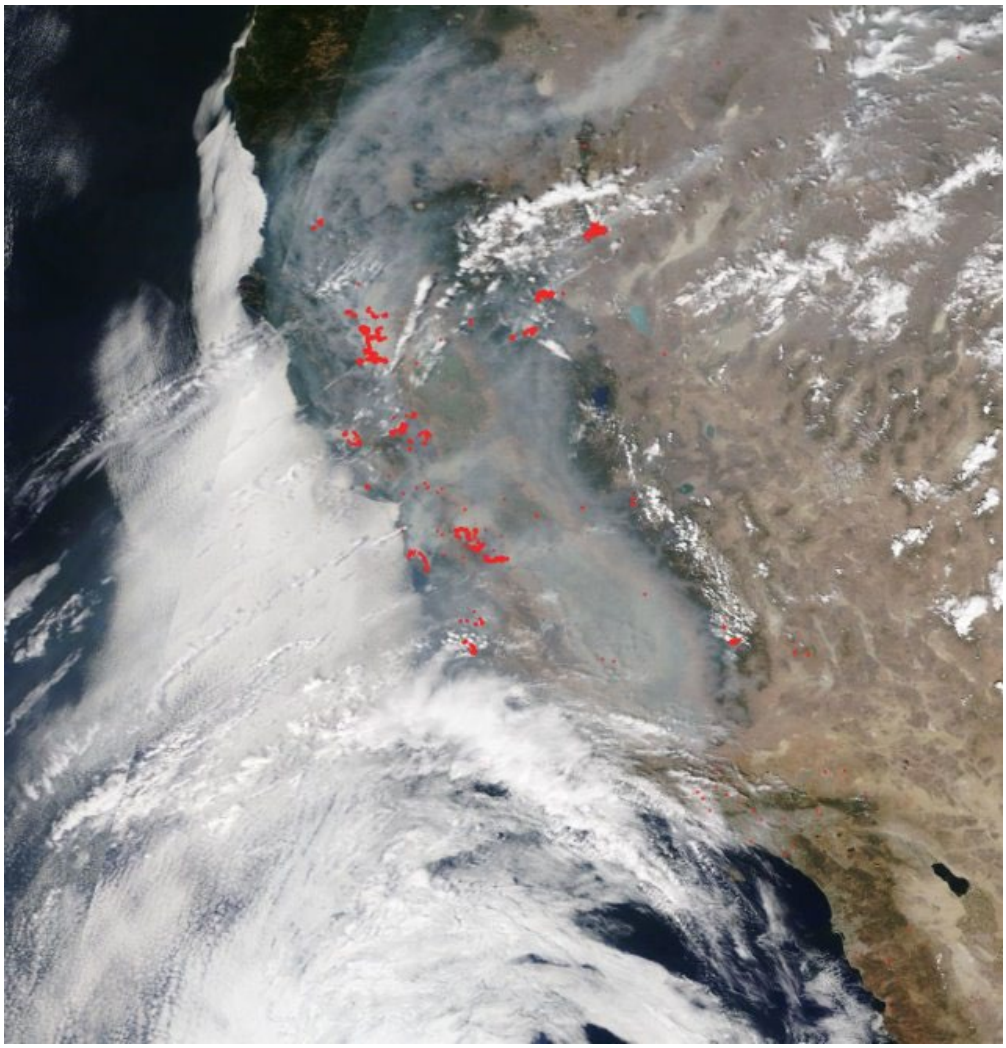
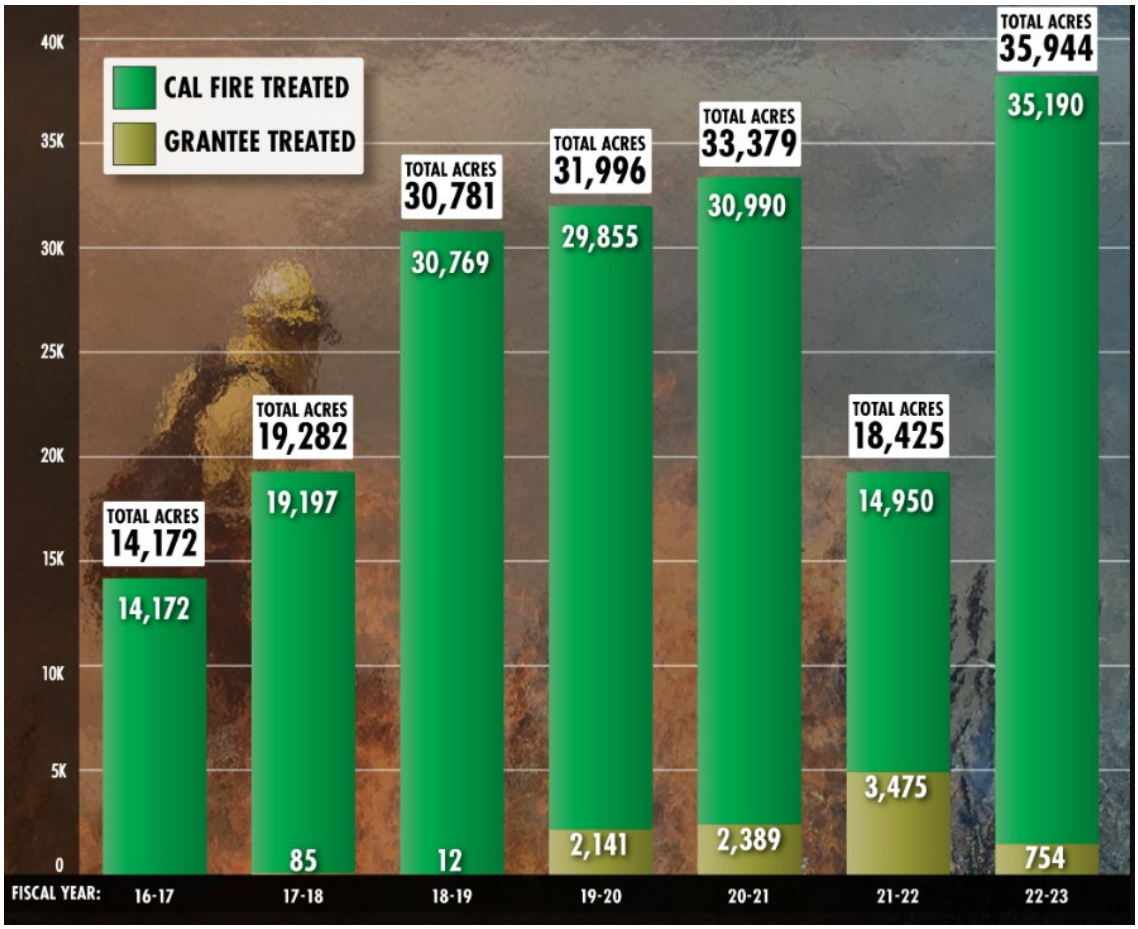


Figure 8. Example of Wildfire Smoke Transported throughout California: NASA Terra Satellite, August 24, 2020



In addition, responding to the growing threat of wildfires, prescribed fire acres have increased in recent years, as shown below in Figure 9.

Figure 9: CAL FIRE Prescribed Acres (2016-2023)



Acres treated by CAL FIRE and grantees; numbers as of 4/10/2024
Source: *CAL FIRE*

7. Assessment of Current Strategy

Statutory Requirements

Section 51.308(g)(6) requires "[a]n assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Class I Federal areas affected by emissions from the State, to meet all established reasonable progress goals for the period covered by the most recent plan required under paragraph (f) of this section."

The long-term strategy laid out in California's Regional Haze Plan for the second planning period was focused on the reduction of NOx emissions from mobile sources. These reductions were key to meeting multiple federal air quality standards in the State including the 2028 reasonable goals. As detailed in Sections 3 and 5, NOx emissions from mobile sources are decreasing. Visibility impairment has varied year to year—changing activity patterns associated with COVID19, unprecedented wildfire activity, and increasing scale of prescribed burning has likely contributed to this variability and underscored the challenges associated with unpacking trends and sources using the regional haze metric as well as the challenges with incomplete data years.

As shown in Tables 17 through 19, there are improvements needed to meet established reasonable progress goals in 2028; however, reaching those goals remains feasible. As discussed in Section 6 (Assessment of Changes Impeding Visibility Progress), 2018-2022 was a time period uniquely impacted by numerous significant wildfires, with smoke impacting visibility progress in Class I areas. In addition, as discussed in Section 3 (Emissions Reductions from Regional Haze SIP Strategies), ongoing implementation of CARB's comprehensive mobile source control strategy ensures anticipated emission reductions from on-road mobile sources will occur timely by 2028.

In Northern California, the progress needed to meet 2028 reasonable progress goals on the most impaired days ranges from 0.2 to 0.9 dv (Table 17). As shown in Table 18, the progress needed to meet 2028 goals ranges from 0.5 to 2.1 dv in Central California. In Southern California, the progress needed ranges from 0.8 to 1.9 dv (Table 19). While the range is larger for Central and Southern California, the larger needs are at Class I areas that started with higher levels of impairment and where, consequently, visibility improvements have been occurring at a faster rate.

Table 17: Comparison Between Current Visibility and 2028 Reasonable Progress Goals in Northern CA

IMPROVE MONITORING SITE Associated Class I Area(s)	Current Visibility Most Impaired Days (dv)	2028 RPG Most Impaired Days (dv)	Progress Needed to Reach 2028 RPGs (dv)
LABE1 Lava Beds National Monument South Warner Wilderness	9.2	8.9	0.3

IMPROVE MONITORING SITE Associated Class I Area(s)	Current Visibility Most Impaired Days (dv)	2028 RPG Most Impaired Days (dv)	Progress Needed to Reach 2028 RPGs (dv)
REDW1 Redwood National Park	12.1	11.9	0.2
TRIN1 Marble Mountain Wilderness Yolla Bolly-Middle Eel Wilderness	10.6	9.5	0.9
LAVO1 Caribou Wilderness Lassen Volcanic National Park Thousand Lakes Wilderness	9.9	9.4	0.5
BLIS1 Desolation Wilderness Mokelumne Wilderness	8.6	8.3	0.3
PORE1 Point Reyes National Seashore	15.2	14.4	0.8
YOSE1 Emigrant Wilderness Yosemite National Park	11.6	10.4	0.8

Table 18: Current Impairment and 2028 Reasonable Progress Goals in Central CA

IMPROVE MONITORING SITE Associated Class I Area(s)	Current Visibility Most Impaired Days (dv)	2028 RPG Most Impaired Days (dv)	Progress Needed to Reach 2028 RPGs (dv)
HOOV1 Hoover Wilderness	7.6	7.1	0.5
KAIS1 Ansel Adams Wilderness John Muir Wilderness Kaiser Wilderness	10.8	9.8	1.0
PINN1 Pinnacles National Monument Ventana Wilderness	13.6	13.0	0.6
SEQU1 Kings Canyon National Park Sequoia National Park	18.2	16.1	2.1
RAFA1 San Rafael Wilderness	14.2	13.0	1.2

Table 19: Current Impairment and 2028 Reasonable Progress Goals in Southern CA

IMPROVE MONITORING SITE Associated Class I Area(s)	Current Visibility Most Impaired Days (dv)	2028 RPG Most Impaired Days (dv)	Progress Needed to Reach 2028 RPGs (dv)
DOME1 Domeland Wilderness	14.9	13.7	0.8
SAGA1 Cucamonga Wilderness San Gabriel Wilderness	13.1	11.5	1.6

IMPROVE MONITORING SITE Associated Class I Area(s)	Current Visibility Most Impaired Days (dv)	2028 RPG Most Impaired Days (dv)	Progress Needed to Reach 2028 RPGs (dv)
SAGO1 San Gorgonio Wilderness San Jacinto Wilderness	13.7	12.0	1.7
JOSH1 Joshua Tree National Park	12.7	11.3	1.4
AGTI1 Agua Tibia Wilderness	16.4	14.5	1.9

Current visibility conditions at the clearest days remain below the 2000-2004 baseline conditions at all Class I areas in California. Given the substantial emission reductions, there is no indication that visibility on the clearest days will degrade to the point where baseline conditions are exceeded.

An assessment of California's contribution to visibility impairment in neighboring states was included in California's past Regional Haze Plans. The assessments focused on Class I areas in states adjacent to California: Oregon, Nevada, and Arizona. Given that emission reductions are in line with those projected in the most recent Regional Haze Plan, there is no indication that California emissions will impact Class I areas in neighboring states from achieving the reasonable progress goals that were laid out for 2028.

To ensure that measures are implemented and emissions reductions are achieved at the fastest pace and largest scale possible, EPA must take action to approve the CAA Section 209 waivers that have been submitted by California. The lack of action on the pending waivers limits California's efforts to address emissions from mobile sources—sources that remain the largest contributor to air quality challenges throughout the state.

8. Long-Term Strategies Containing Smoke Management Programs

Statutory Requirements

Section 51.308(g)(8) requires, "[f]or a state with a long-term strategy that includes a smoke management program for prescribed fires on wildland that conducts a periodic program assessment, a summary of the most recent periodic assessment of the smoke management program including conclusions if any that were reached in the assessment as to whether the program is meeting its goals regarding improving ecosystem health and reducing the damaging effects of catastrophic wildfires."

This requirement does not apply because California's long-term strategy as adopted in the regional haze SIPs does not rely on the State's smoke management program.

CARB supports the State's mission to protect our natural and working lands through the safe, beneficial burning of cropland wastes and accumulated wildland debris. CARB's agricultural and prescribed burning programs support local decisions to ensure that public health and safety are protected during managed burns. CARB carries out its responsibilities for agricultural and prescribed burning as defined in Title 17 of the California Code of Regulations, Section 80100, "Smoke Management Guidelines for Agricultural and Prescribed Burning." The requirements cover all facets of the program, including requirements for CARB's daily burn decisions, smoke management plans, and local air districts' notification and reporting requirements.

9. Determination of Adequacy

Statutory Requirements

Section 51.308(h) requires that "the State must also take one of the following actions based upon the information presented in the progress report:

"(1) If the State determines that the existing implementation plan requires no further substantive revision at this time in order to achieve established goals for visibility improvement and emissions reductions, the State must provide to the Administrator a declaration that revision of the existing implementation plan is not needed at this time.

"(2) If the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another State(s) which participated in a regional planning process, the State must provide notification to the Administrator and to the other State(s) which participated in the regional planning process with the States. The State must also collaborate with the other State(s) through the regional planning process for the purpose of developing additional strategies to address the plan's deficiencies.

"(3) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, the State shall provide notification, along with available information, to the Administrator.

"(4) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources within the State, the State shall revise its implementation plan to address the plan's deficiencies within one year."

California determines that the existing implementation plan requires no further substantive revision at this time in order to achieve established goals for visibility improvement or emissions reductions. A revision to the existing regional haze SIP is not needed at this time.

10. Federal Land Manager Consultation

Statutory Requirements

Section 51.308(i) requires that the opportunity for Federal Land Manager (FLM) consultation on a progress report must be provided no less than 60 days prior to the public hearing or public comment opportunity on the progress report. The consultation must include the opportunity for the FLM to discuss their:

i. Assessment of visibility impairment in the Class I area
ii. Recommendations on the development and implementation of strategies to address visibility impairment

In the draft progress report made available for public comment, states are required to include a description of how the comments received from FLMs were addressed.

CARB provided the draft progress report to the FLMs (National Park Service, Bureau of Land Management, Fish and Wildlife Service, and U.S. Department of Agriculture) for 60-day review on October 22, 2024. The FLMs did not provide any comments.

11. Crosswalk of Required Elements

Regulation Citation (40 CFR)	Regulation Summary	Location
51.308(i)	**FLM Consultation** Did the state provide documentation of and address all comments made by the FLMs from the consultation period, which must take place no less than 60 days prior to the public hearing or public comment opportunity?	Section 10
51.308(g)	**Public Inspection and Comment** Was the draft made available for public inspection and comment for at least 30 days prior to submission to the EPA? Does the Report contain all comments received from the public? If the public comments received resulted in changes made to the progress report, does the report contain an explanation as to why changes were made?	Appendix B
51.308(g)(1)	**Status of Control Measures** Does the report contain a list of all measures the state relied upon in the second planning period?	Section 2
51.308(g)(2)	**Emissions Reductions from RH SIP Strategies** Does the report include estimated emissions reductions from the measures provided under (g)(1)?	Section 3
51.308(g)(3)	**Visibility Progress** Does the report contain a summary of monitored visibility data as required by the regional haze rule?	Section 4
51.308(g)(4)	**Emissions Progress** Does the report provide an analysis of emissions trends as applicable to the current period?	Section 5
51.308(g)(5)	**Assessment of Changes Impeding Visibility Progress** Does the report contain an assessment of and statement if anthropogenic emissions have impeded visibility progress?	Section 6
51.308(g)(6)	**Assessment of Current Strategy** Does the report assess whether current implementation plan strategies are sufficient to meet the RPGs described in the SIP?	Section 7
51.308(g)(8)	**Long-Term Strategy Containing a Smoke Management Program** Does the report address the smoke management program's impact on the long-term strategy?	Section 8
51.308(h)	**Determination of Adequacy** Does the report determine the adequacy of the current implementation of measures incorporated into the SIP?	Section 9

Appendix A: Additional Data and Figures

Figure A-1a: Visibility Conditions to Inform Strategy Assessment at LABE

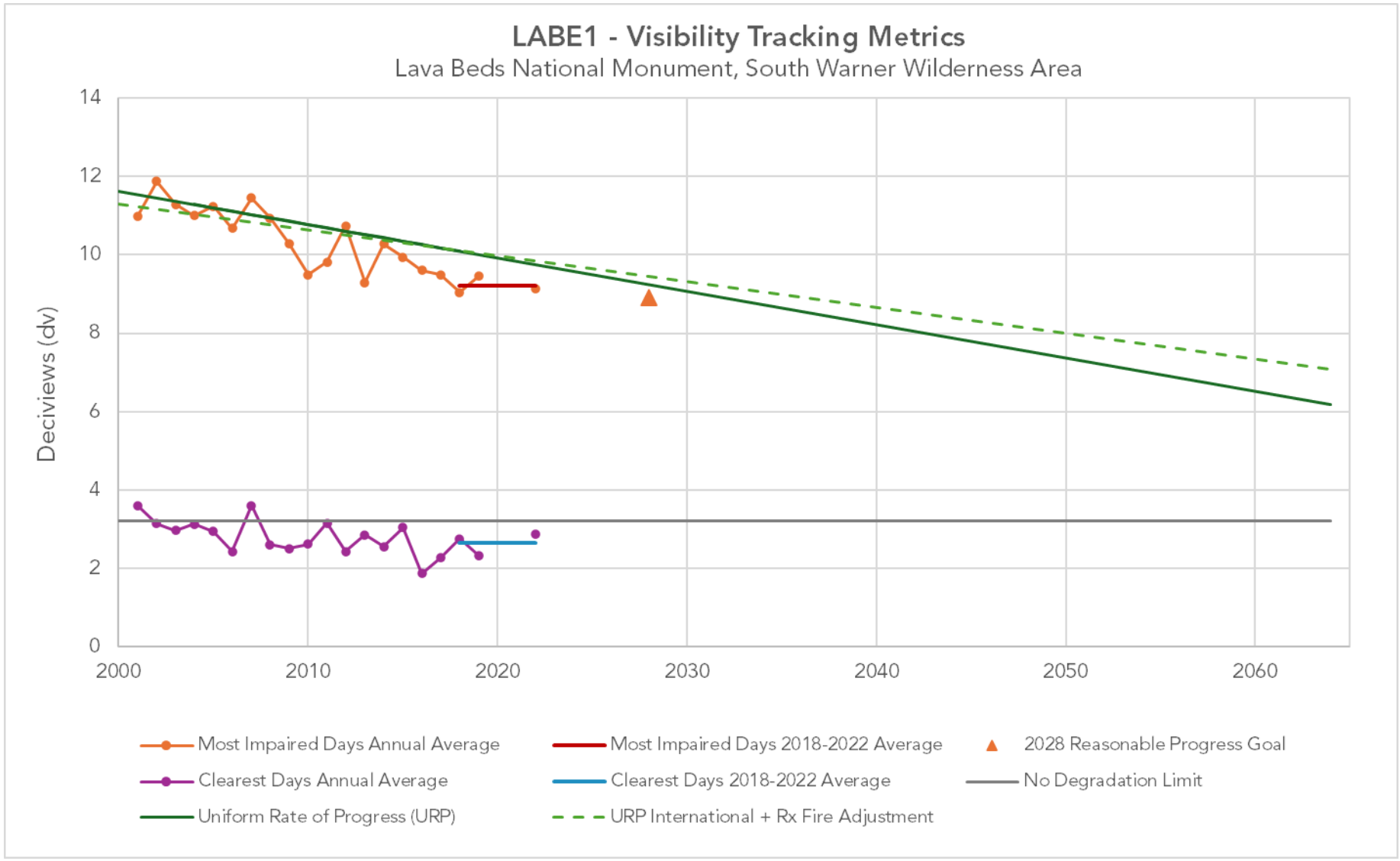


Figure Note: 2018-2022 averages were computed based on 2018, 2019, and 2022 data. Data from 2020 and 2021 were incomplete.

Figure A-1b: Visibility Conditions to Inform Strategy Assessment at LABE

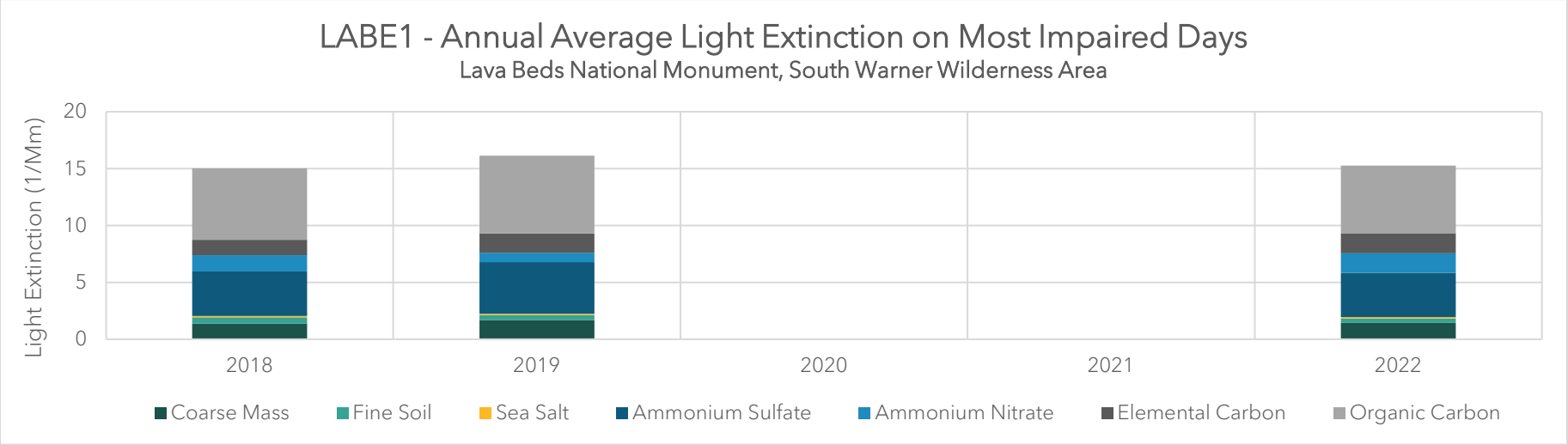


Figure A-1c: Visibility Conditions to Inform Strategy Assessment at LABE

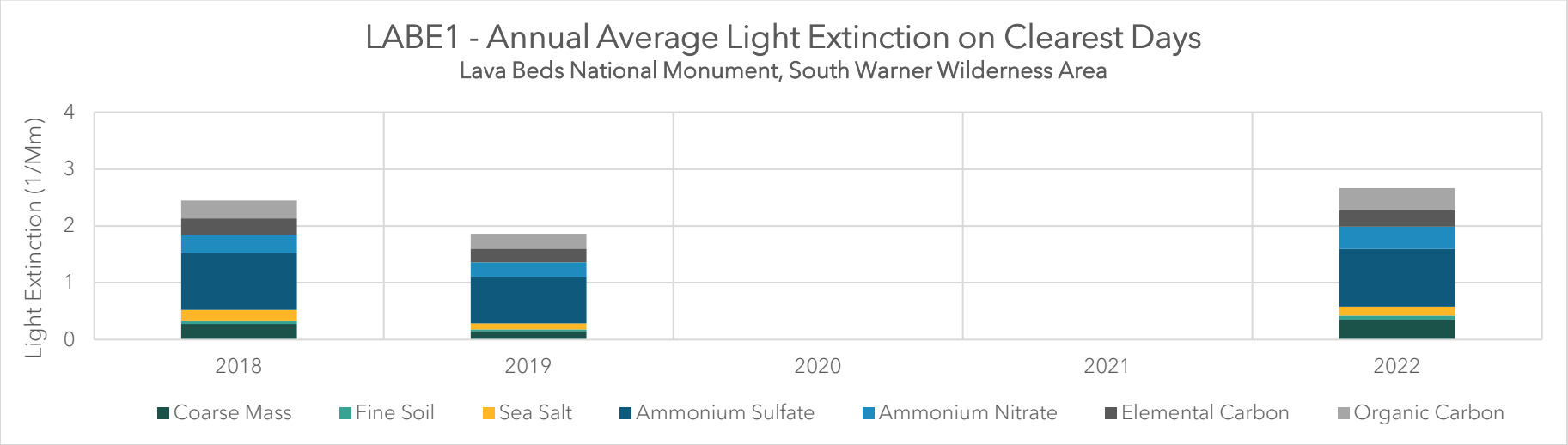


Figure A-2a: Visibility Conditions to Inform Strategy Assessment at REDW

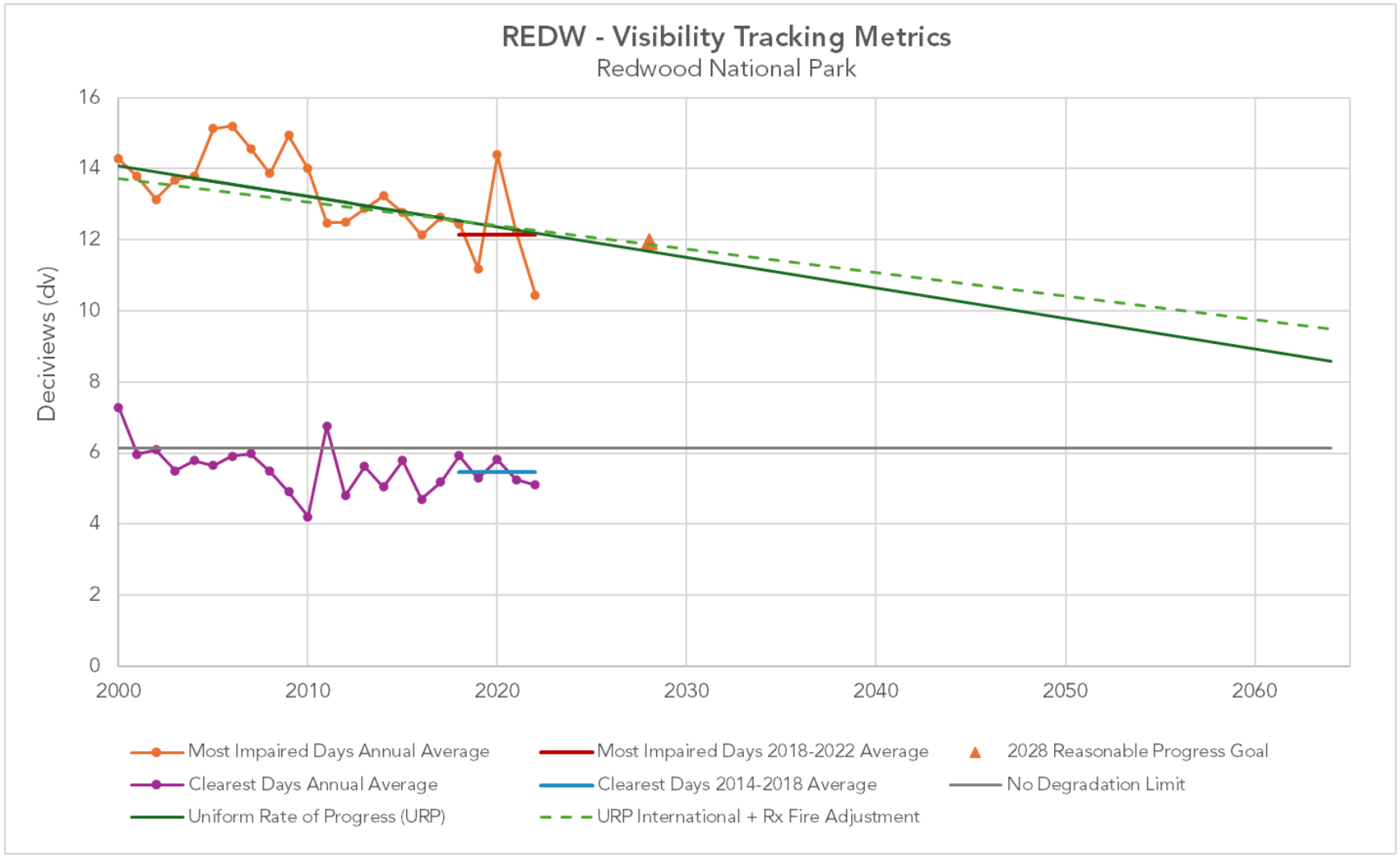


Figure A-2b: Visibility Conditions to Inform Strategy Assessment at REDW1

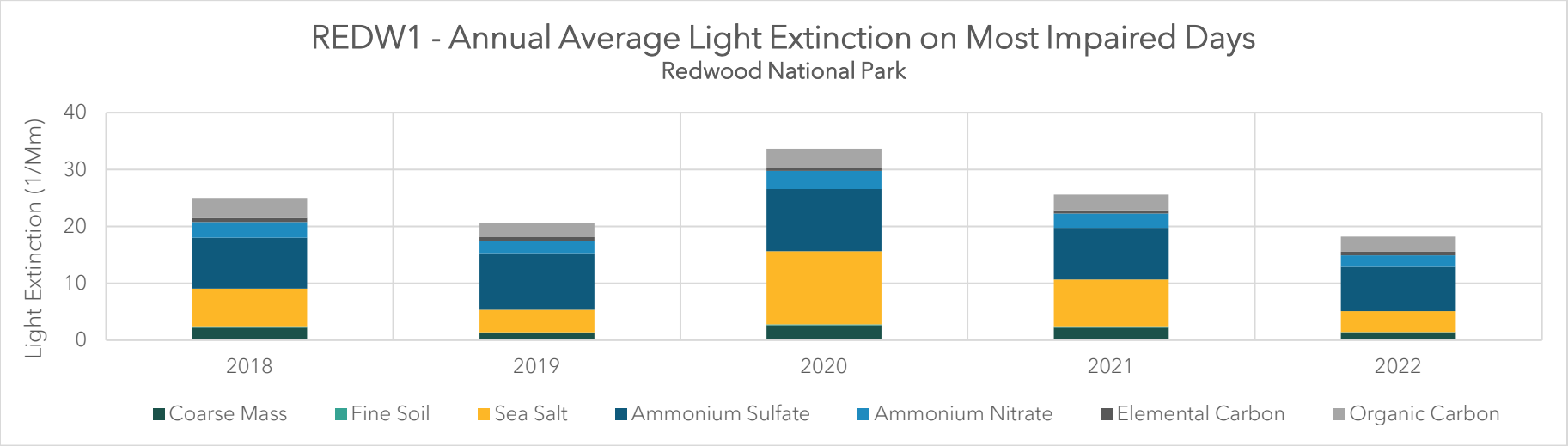


Figure A-2c: Visibility Conditions to Inform Strategy Assessment at REDW1

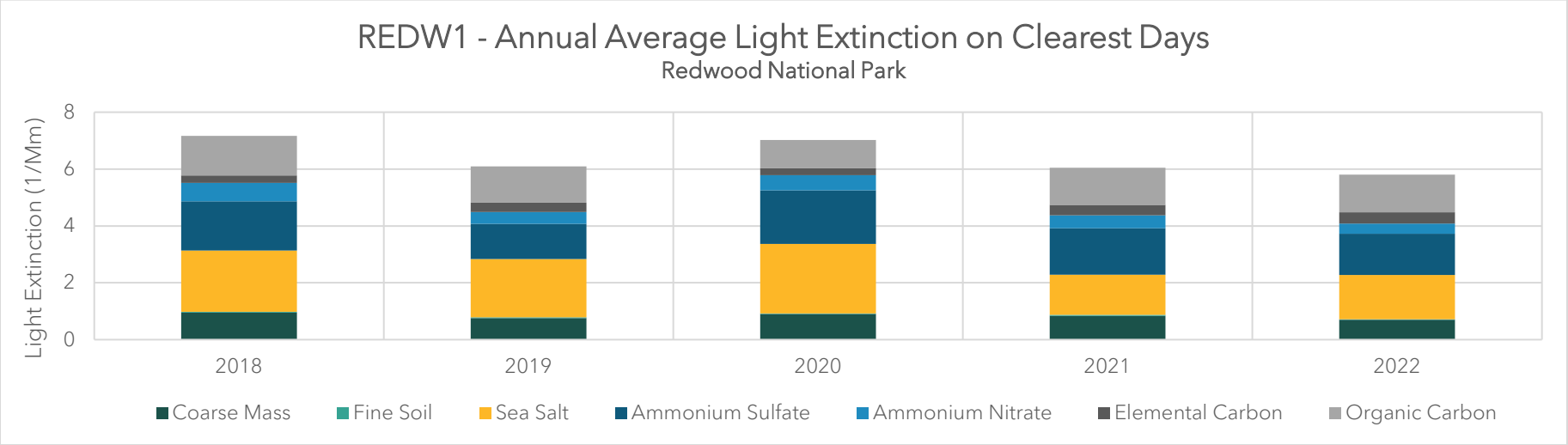


Figure A-3a: Visibility Conditions to Inform Strategy Assessment at TRIN

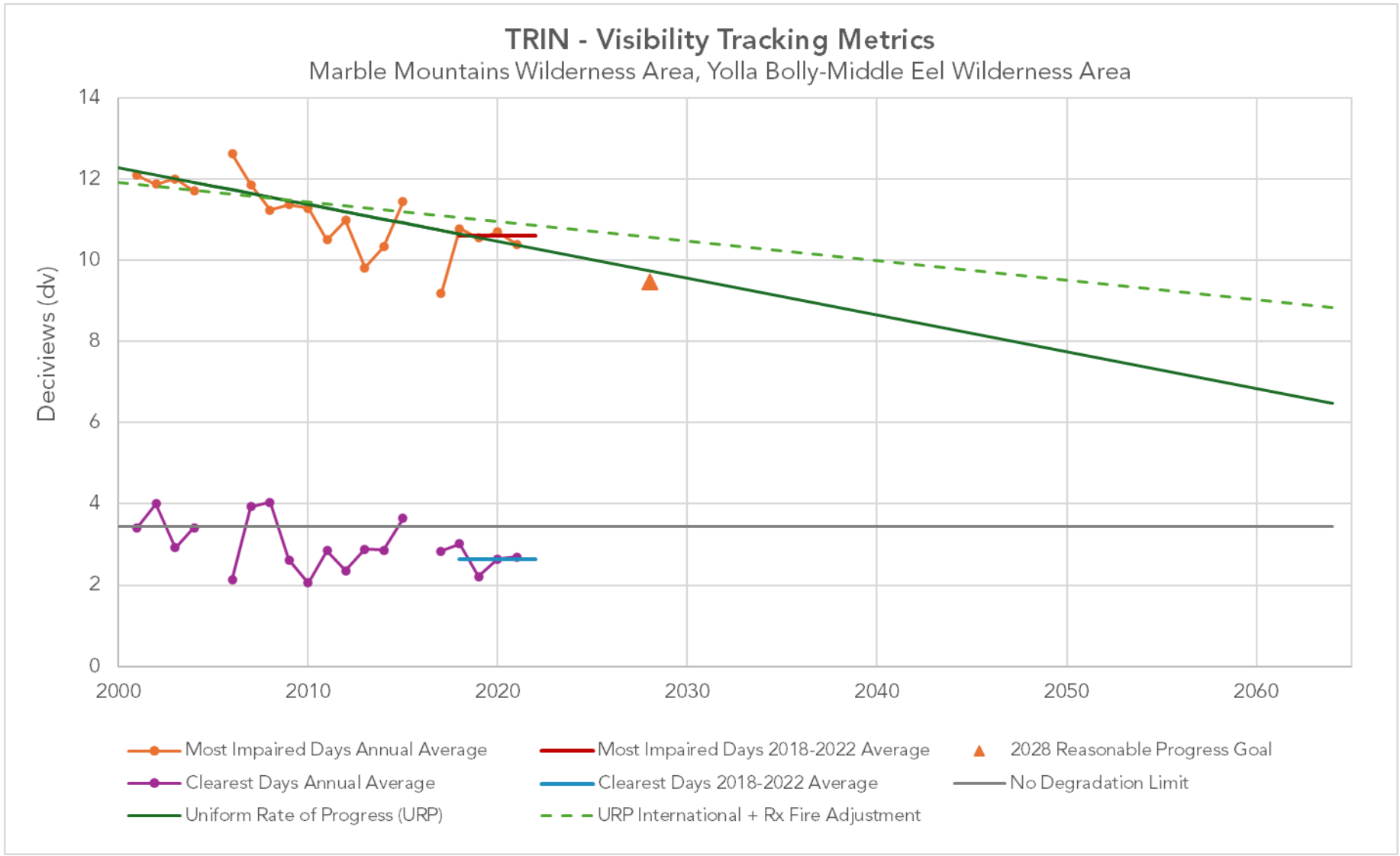


Figure Note: 2018-2022 averages were computed based on 2018, 2019, 2020, and 2021 data. Data from 2022 were incomplete.

Figure A-3b: Visibility Conditions to Inform Strategy Assessment at TRIN

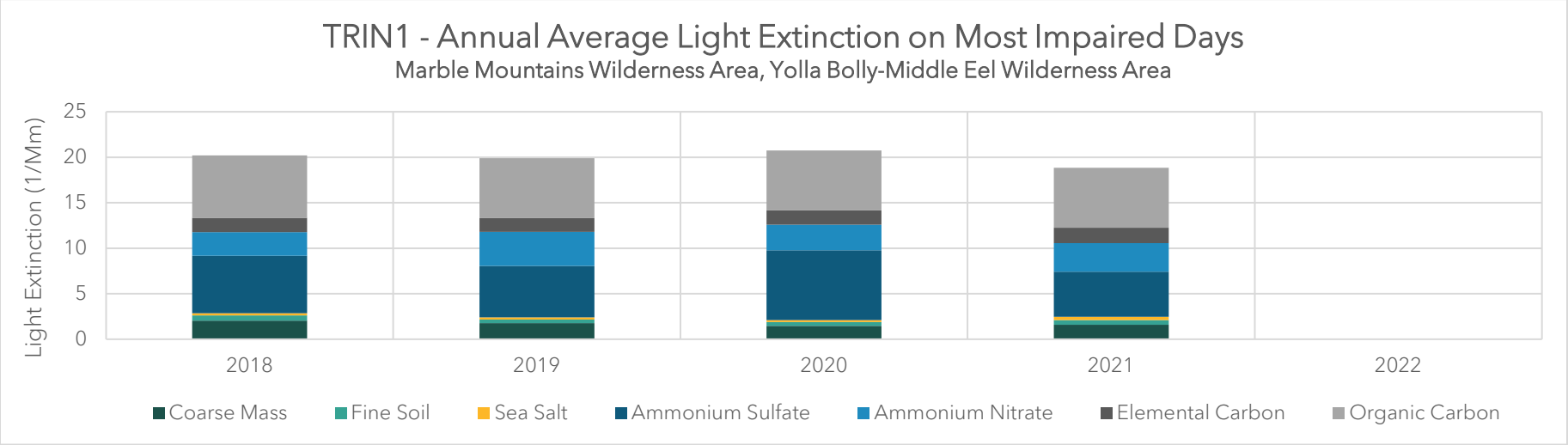


Figure A-3c: Visibility Conditions to Inform Strategy Assessment at TRIN

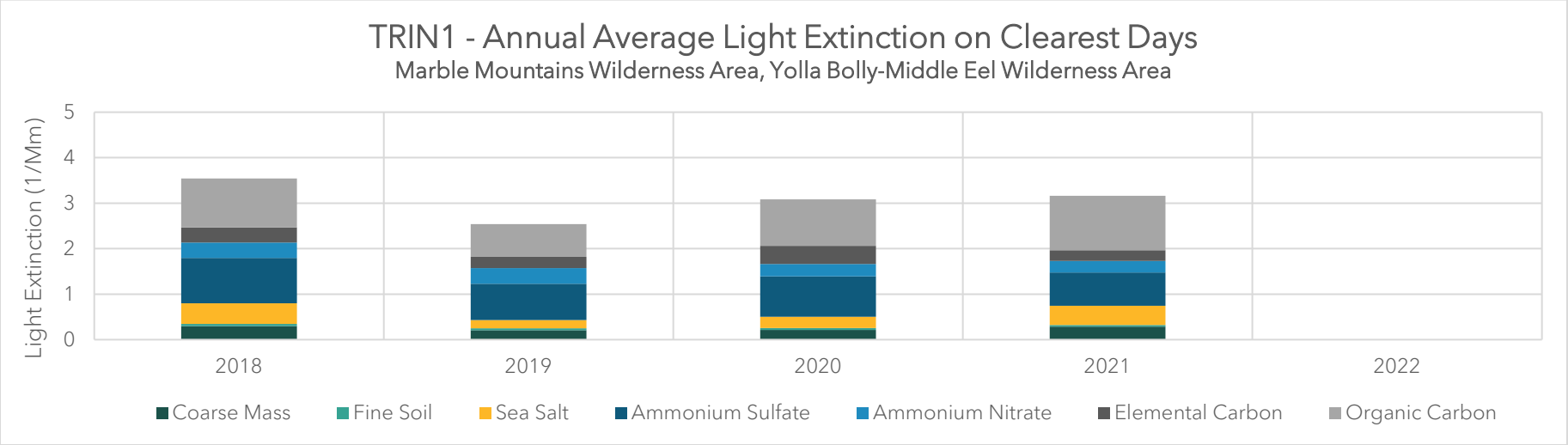


Figure A-4a: Visibility Conditions to Inform Strategy Assessment at LAVO

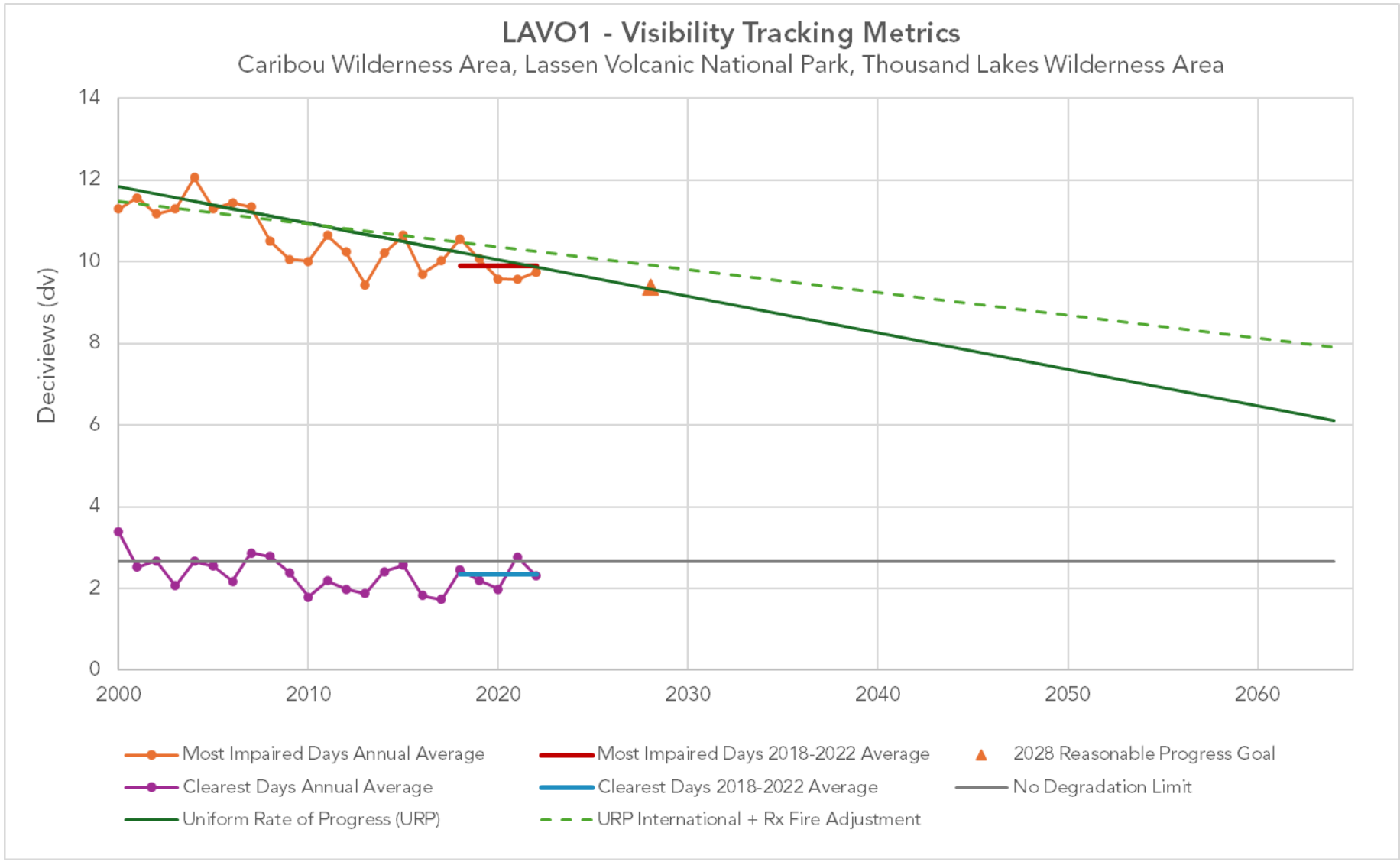


Figure A-4b: Visibility Conditions to Inform Strategy Assessment at LAVO

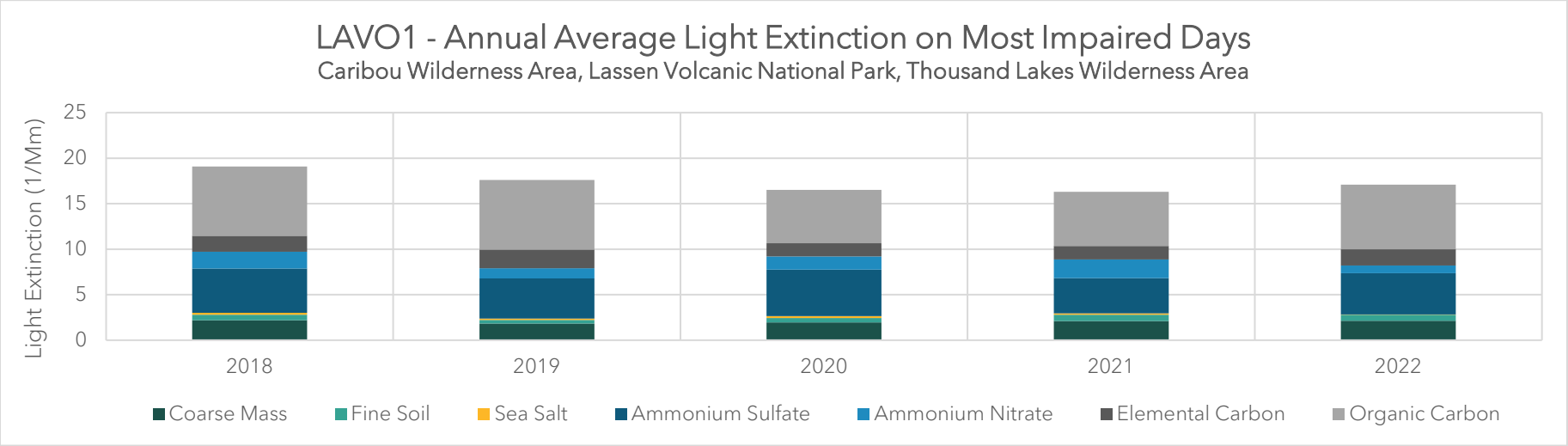


Figure A-4c: Visibility Conditions to Inform Strategy Assessment at LAVO

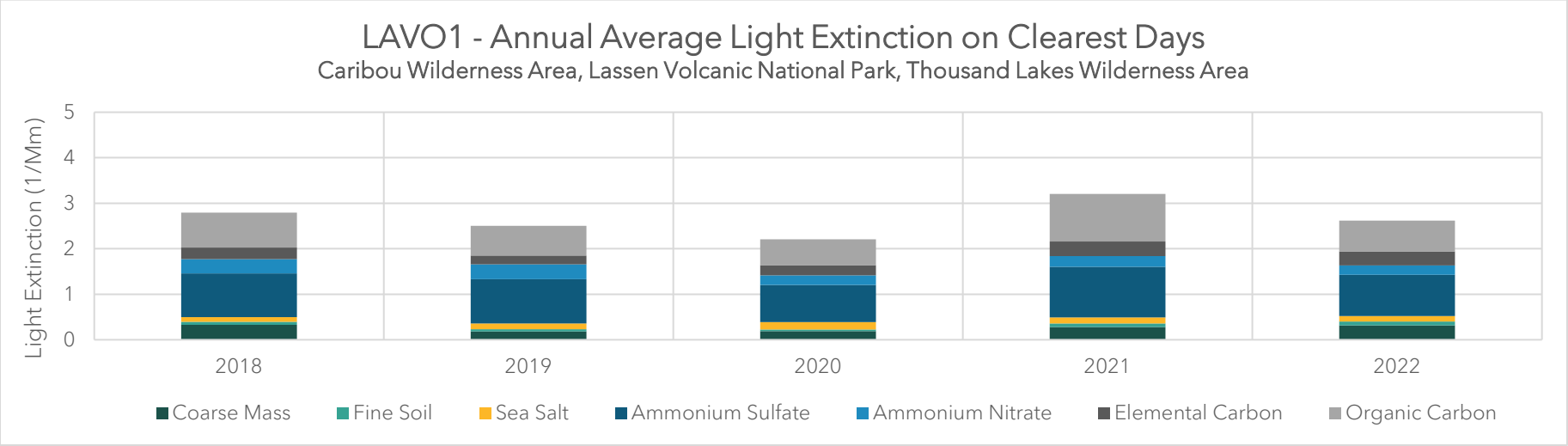


Figure A-5a: Visibility Conditions to Inform Strategy Assessment at BLIS

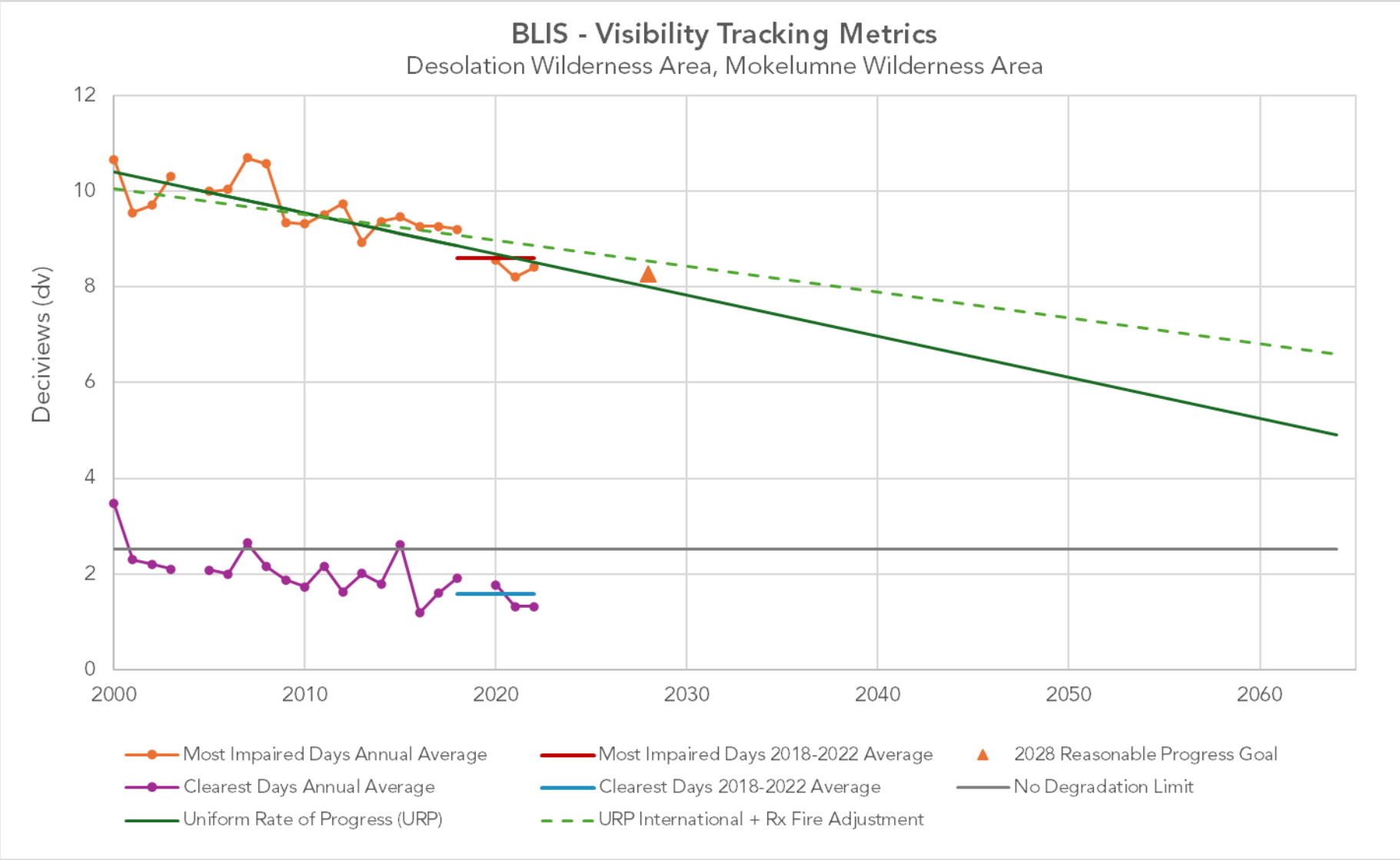


Figure Note: 2018-2022 averages were computed based on 2018 data from BLIS1 and 2020-2022 data from BLIS2. Data from 2019 were incomplete.

Figure A-5b: Visibility Conditions to Inform Strategy Assessment at BLIS

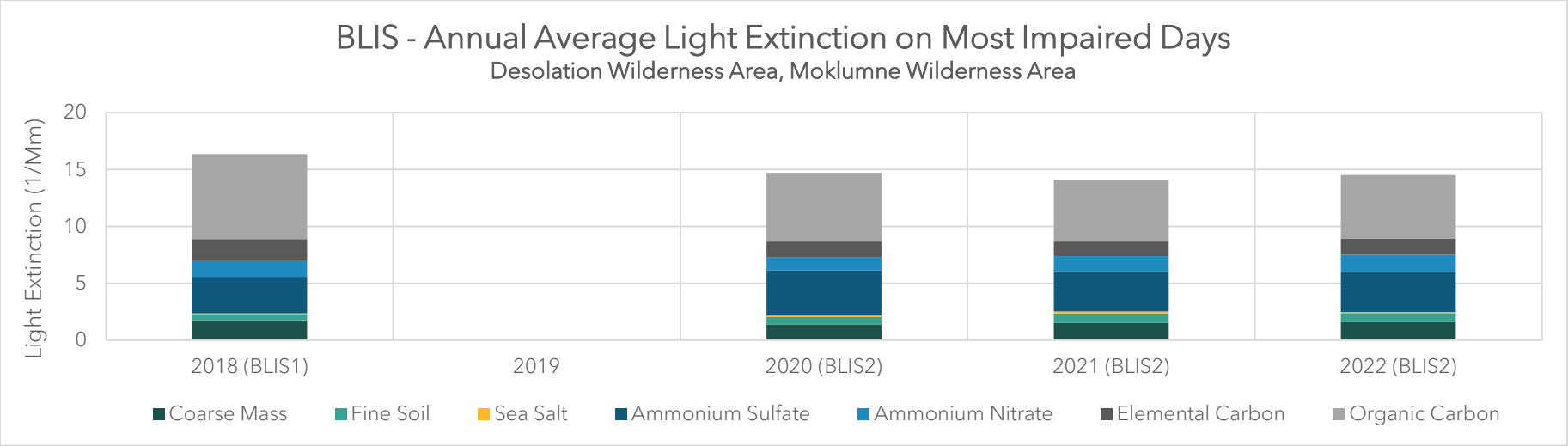


Figure A-5c: Visibility Conditions to Inform Strategy Assessment at BLIS

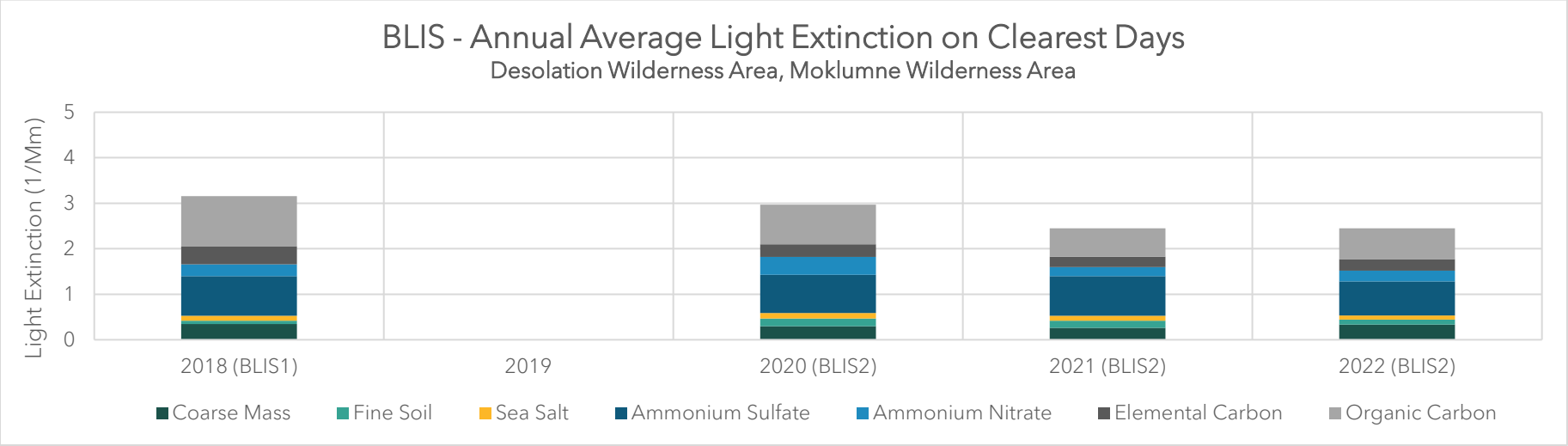


Figure A-6a: Visibility Conditions to Inform Strategy Assessment at PORE

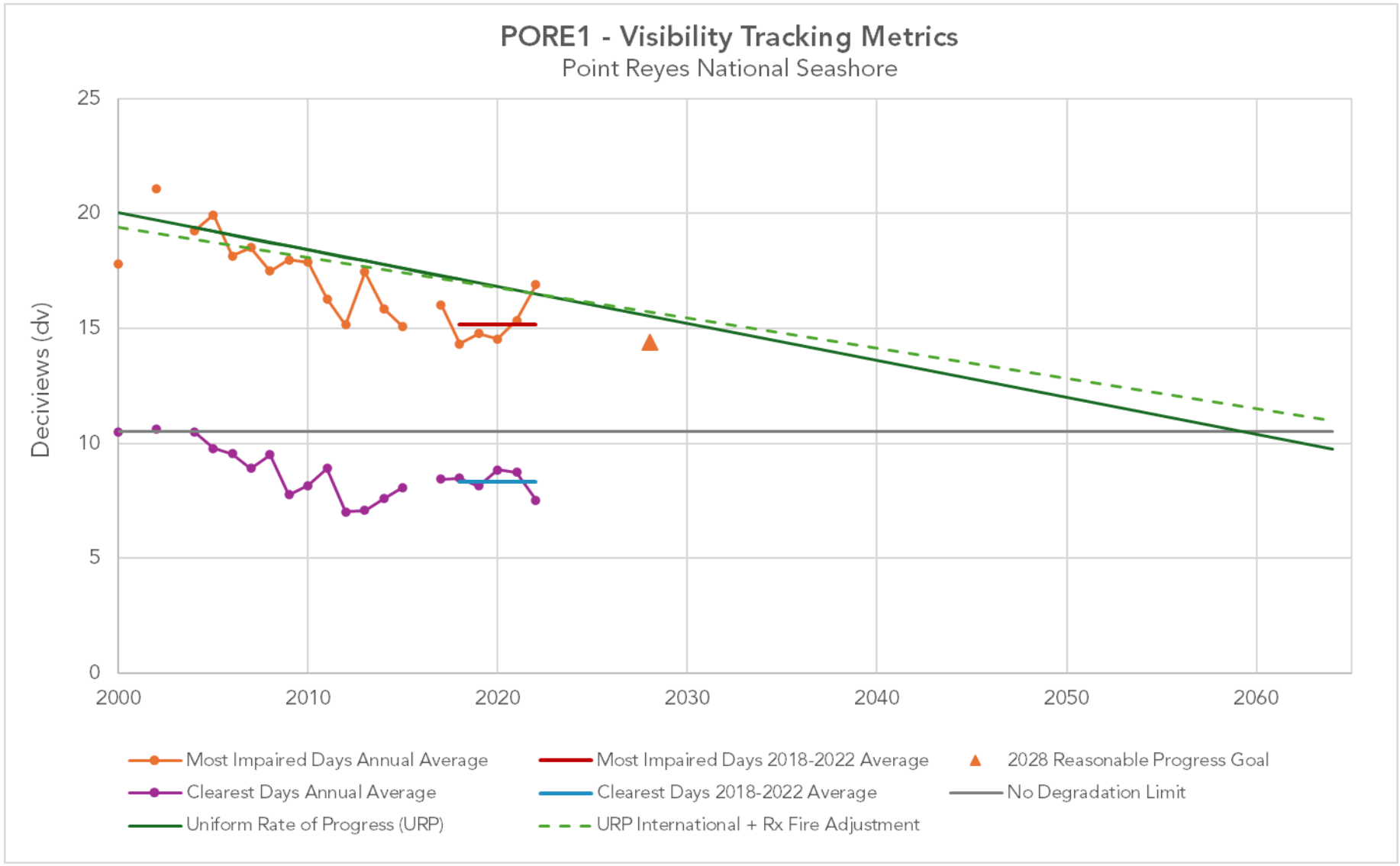


Figure A-6b: Visibility Conditions to Inform Strategy Assessment at PORE

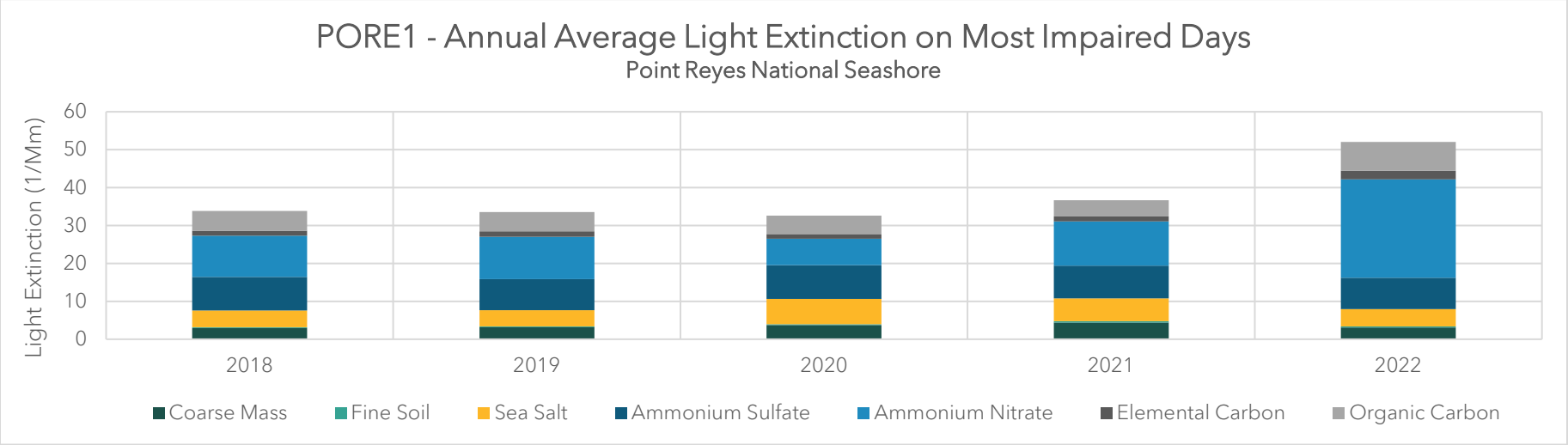


Figure A-6c: Visibility Conditions to Inform Strategy Assessment at PORE

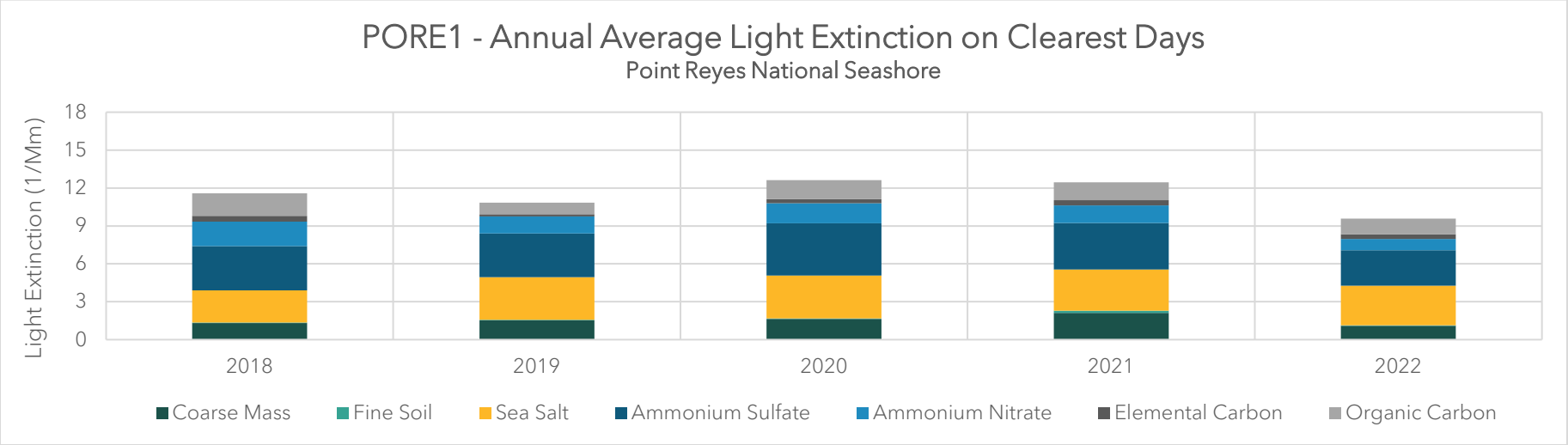


Figure A-7a: Visibility Conditions to Inform Strategy Assessment at YOSE

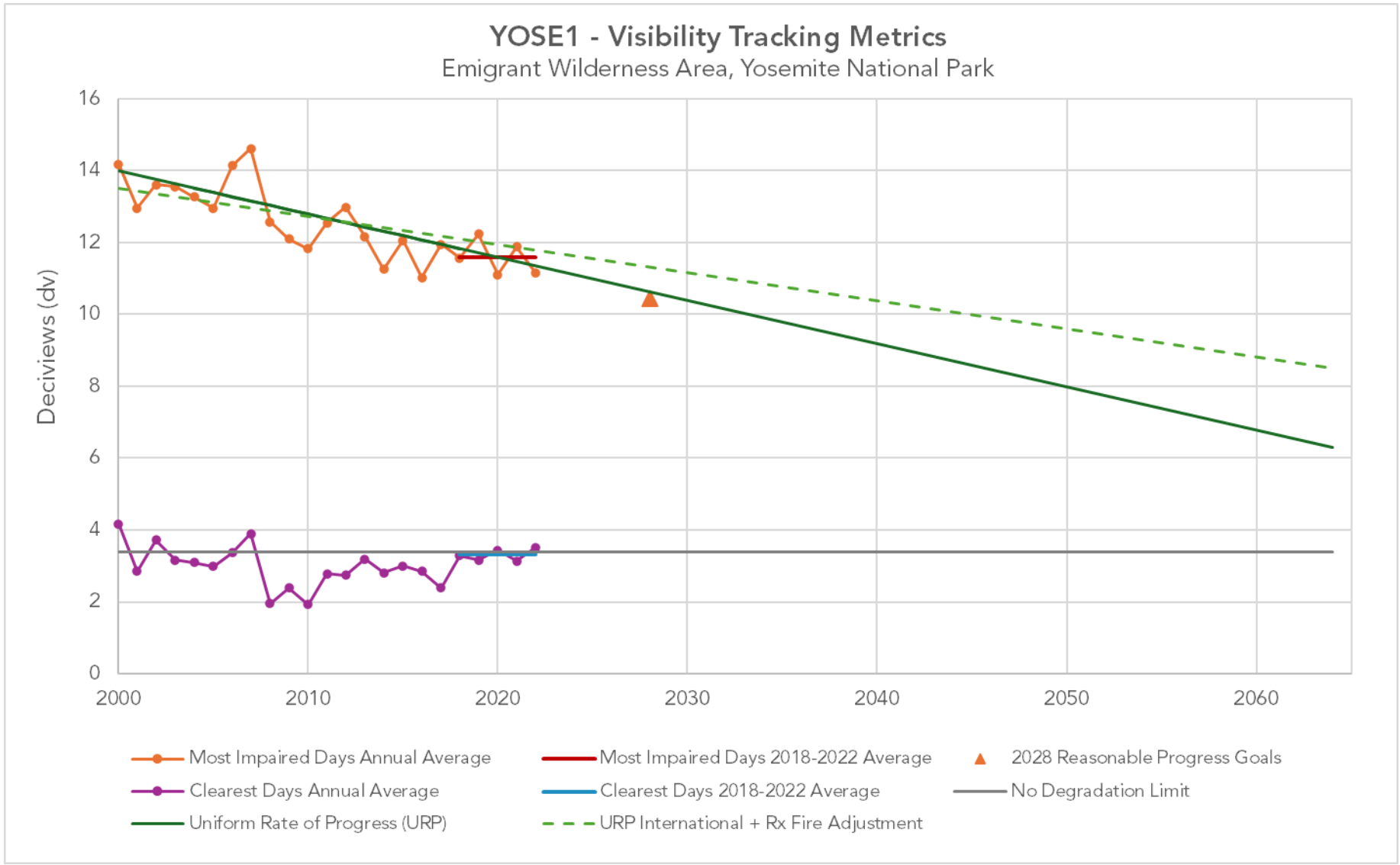


Figure A-7b: Visibility Conditions to Inform Strategy Assessment at YOSE

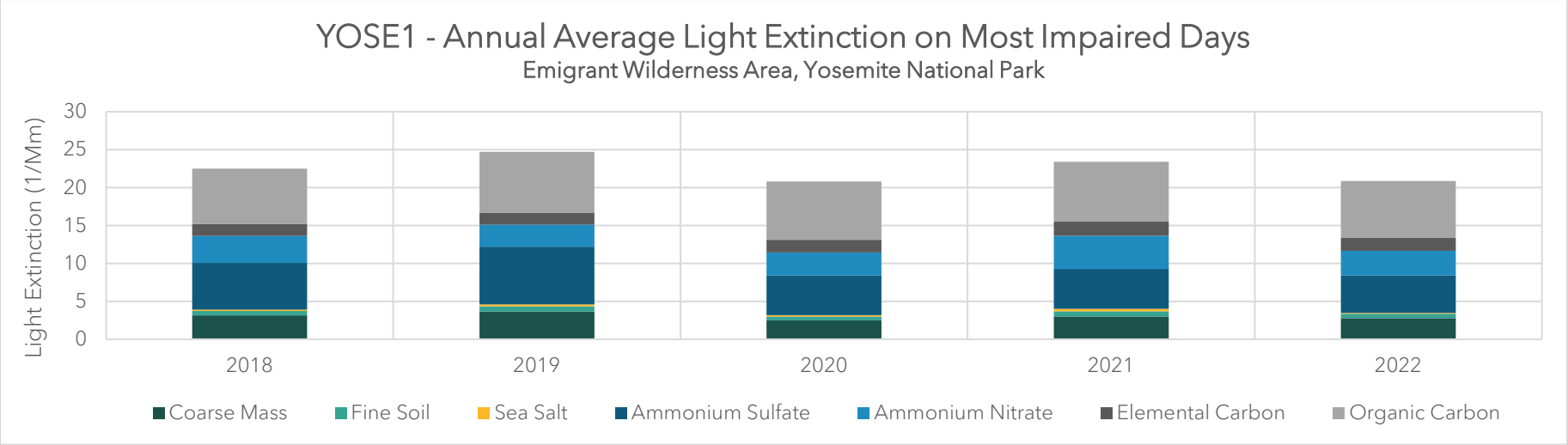


Figure A-7c: Visibility Conditions to Inform Strategy Assessment at YOSE

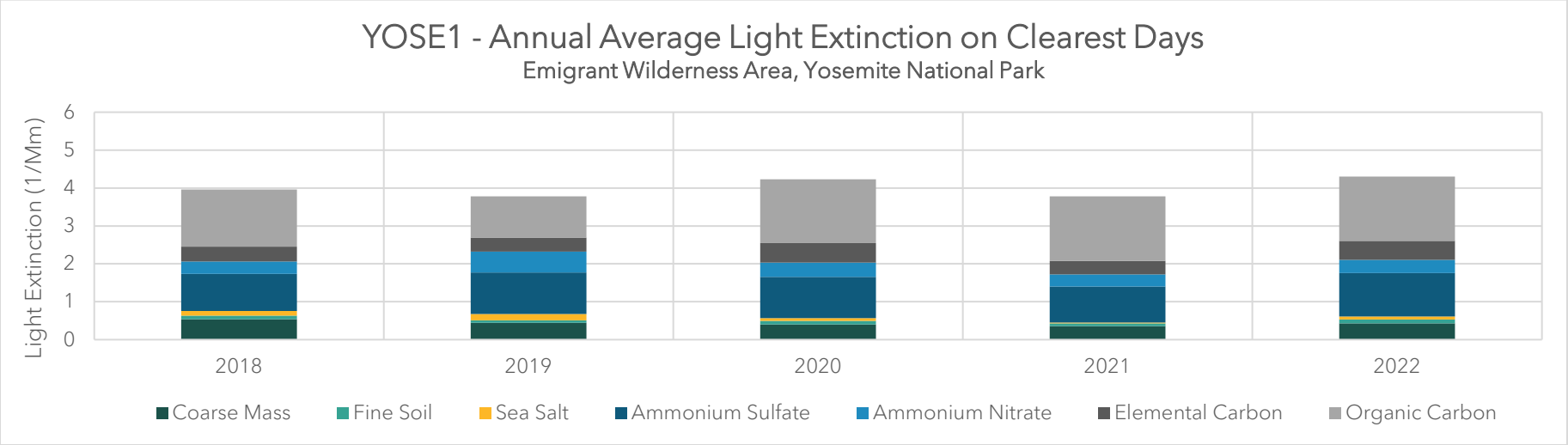


Figure A-8a: Visibility Conditions to Inform Strategy Assessment at HOOV

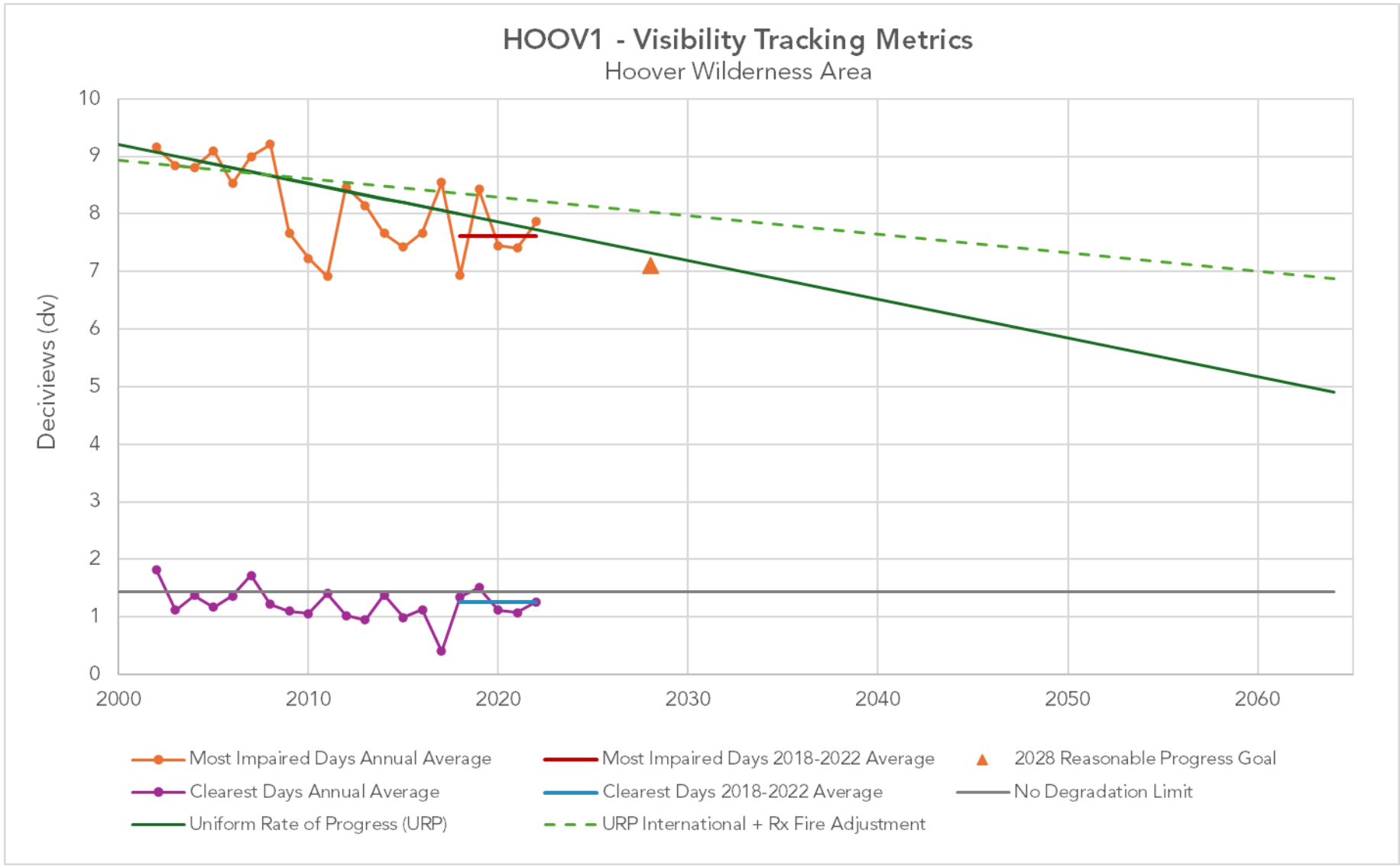


Figure A-8b: Visibility Conditions to Inform Strategy Assessment at HOOV

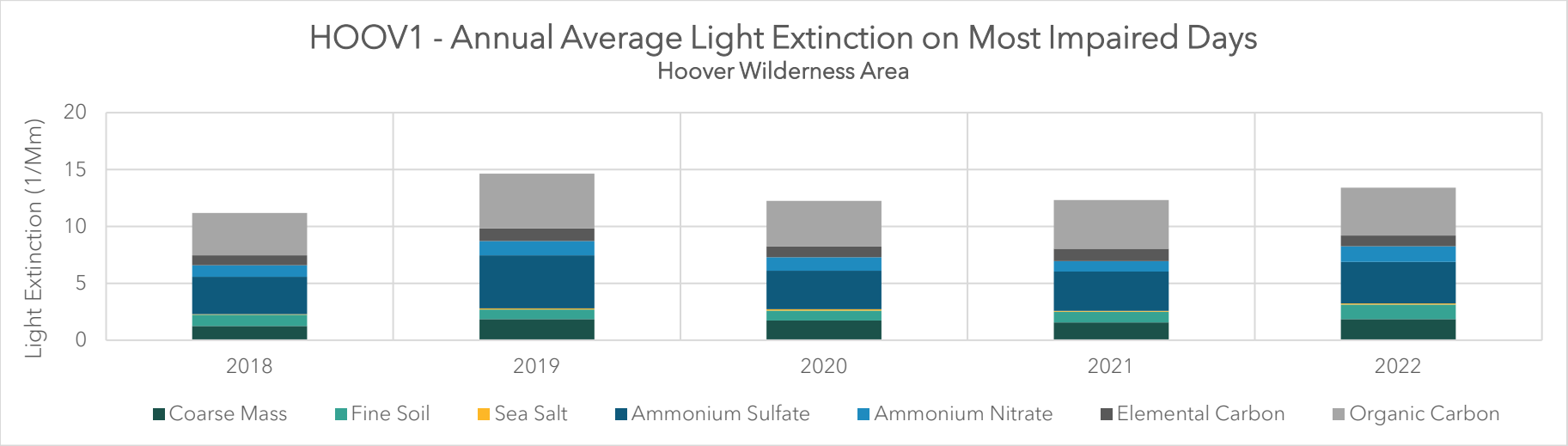


Figure A-8b: Visibility Conditions to Inform Strategy Assessment at HOOV

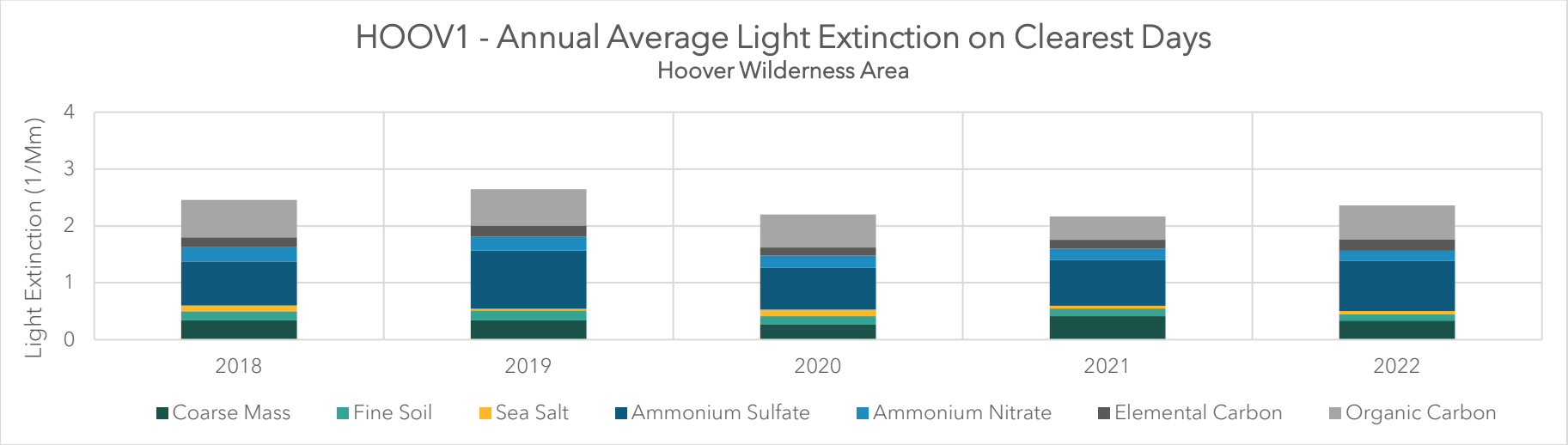


Figure A-9a: Visibility Conditions to Inform Strategy Assessment at KAIS

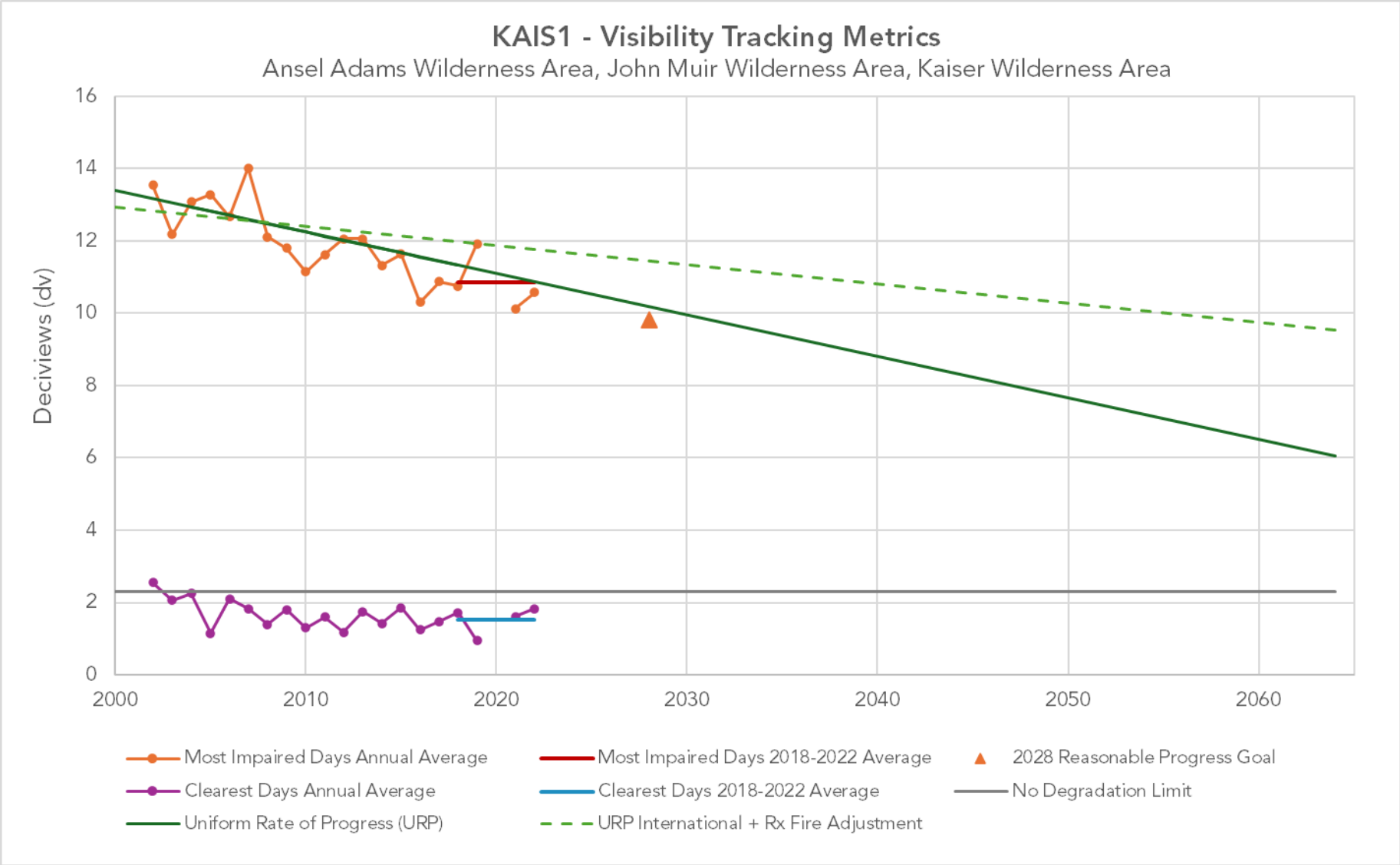


Figure Note: 2018-2022 averages were computed based on 2018, 2019, 2021 and 2022 data. Data from 2020 were incomplete.

Figure A-9b: Visibility Conditions to Inform Strategy Assessment at KAIS

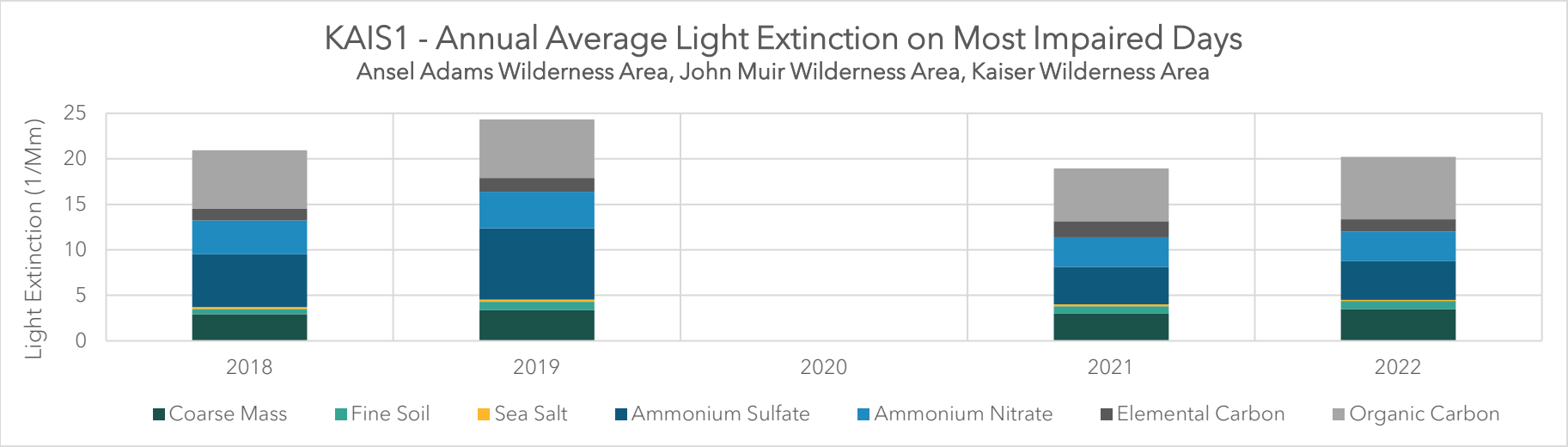


Figure A-9c: Visibility Conditions to Inform Strategy Assessment at KAIS

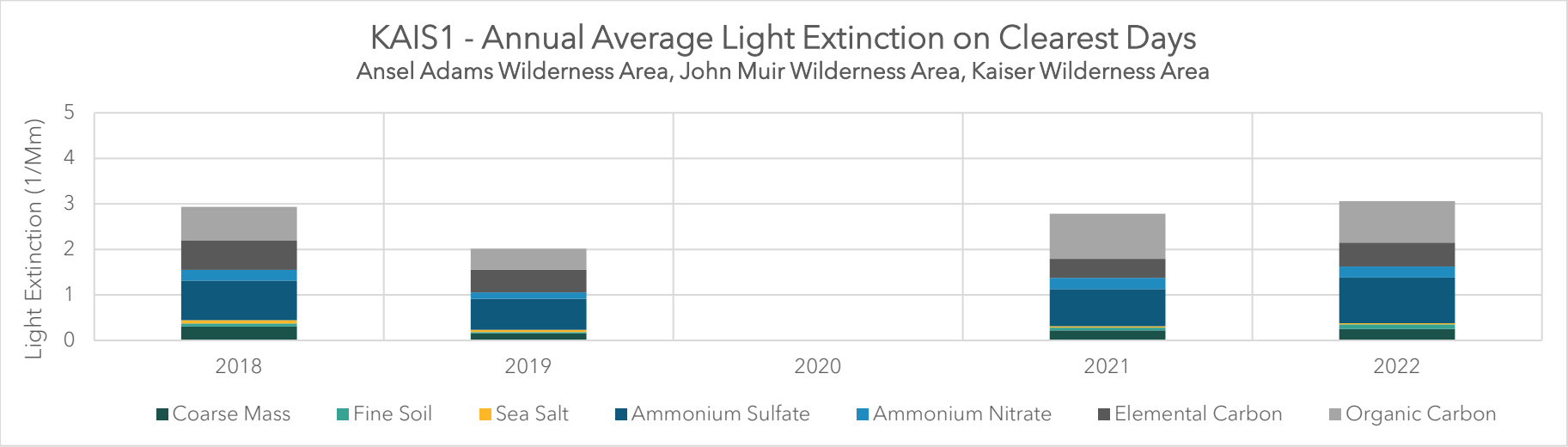


Figure A-10a: Visibility Conditions to Inform Strategy Assessment at PINN

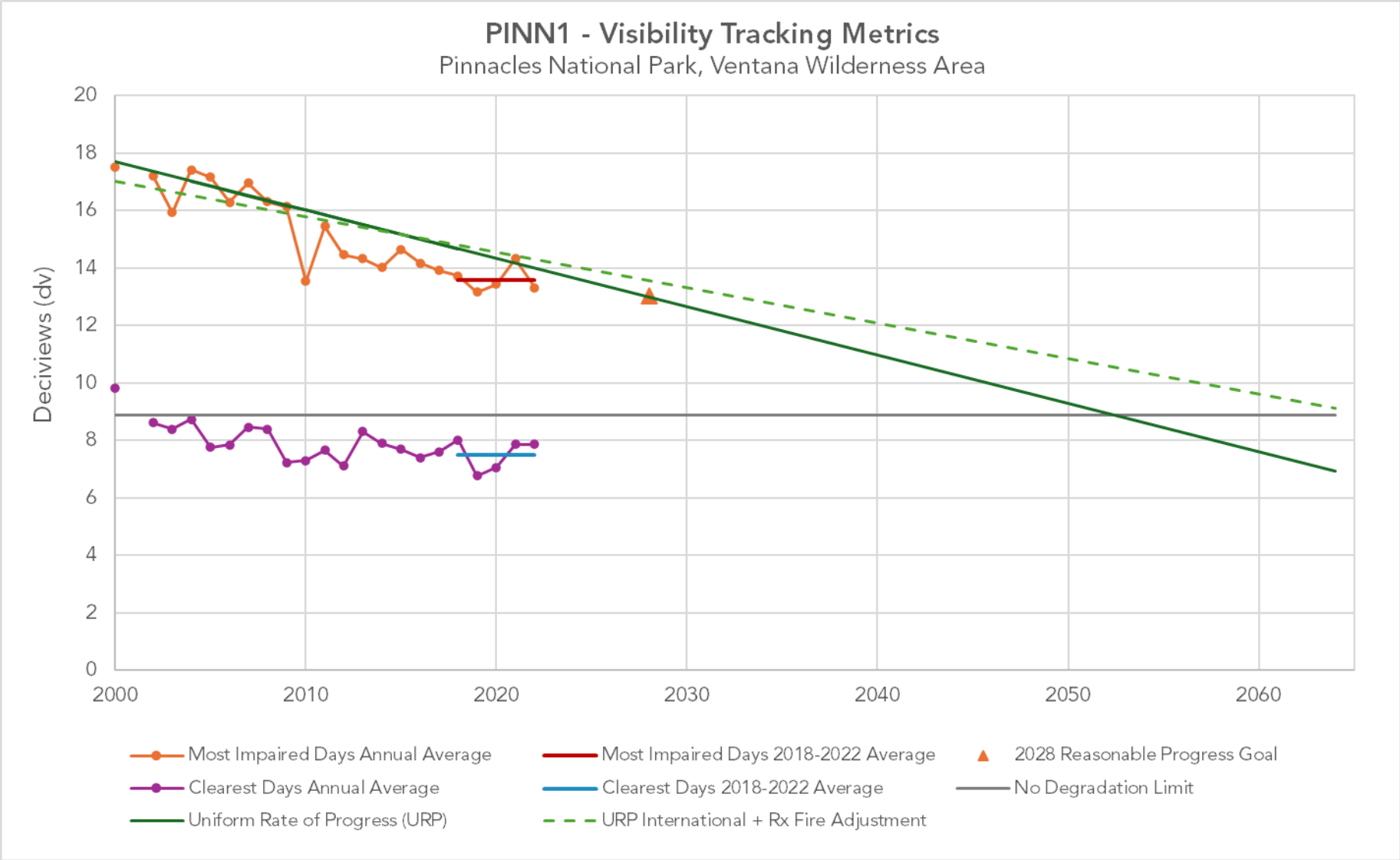


Figure A-10b: Visibility Conditions to Inform Strategy Assessment at PINN

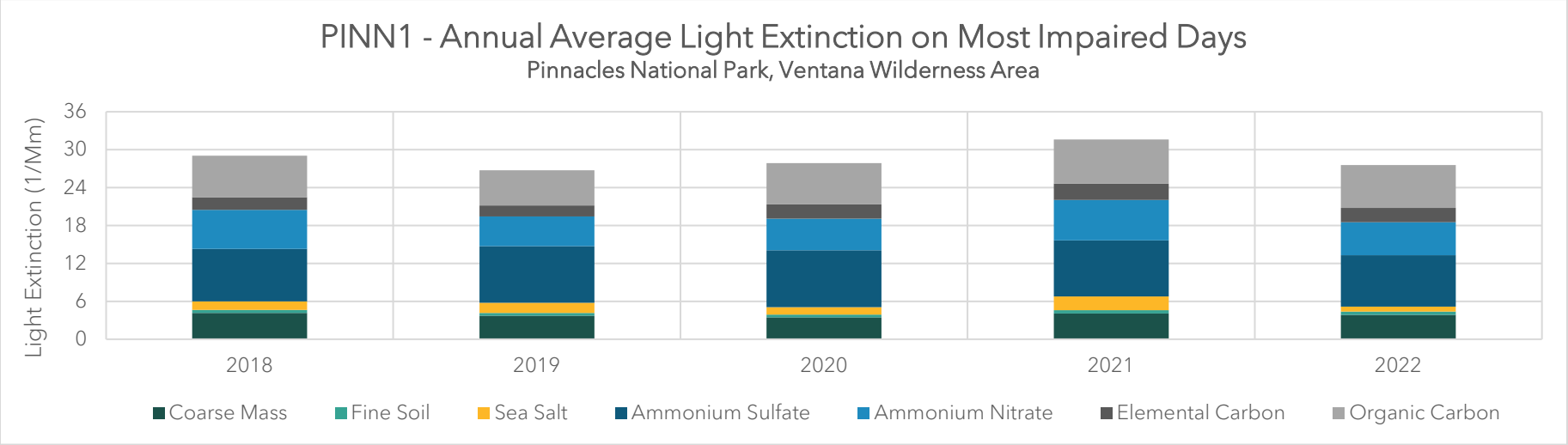


Figure A-10c: Visibility Conditions to Inform Strategy Assessment at PINN

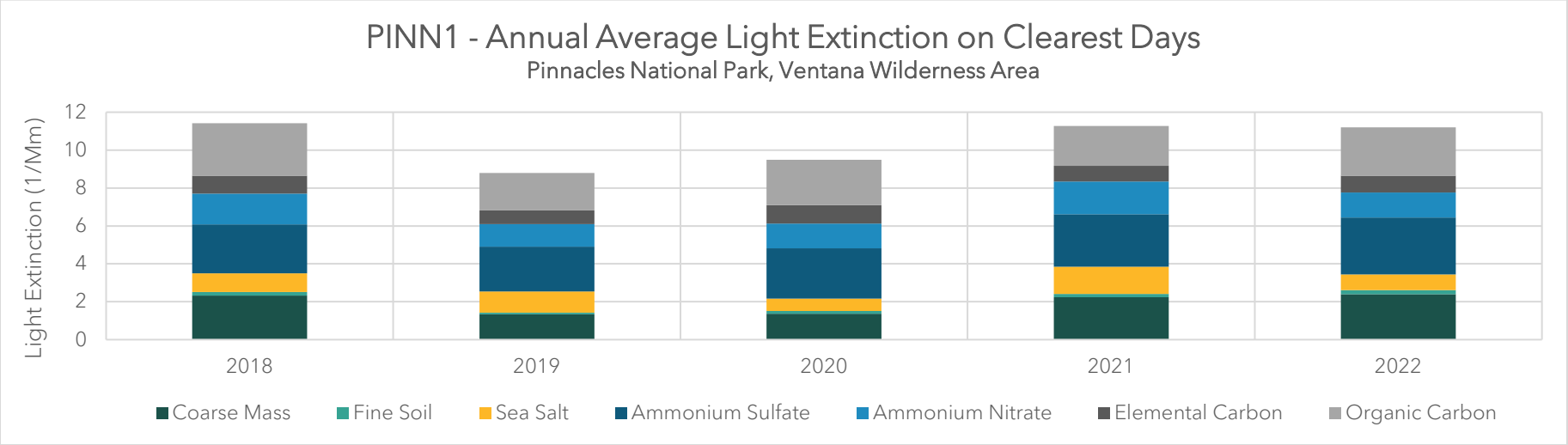


Figure A-11a: Visibility Conditions to Inform Strategy Assessment at SEQU

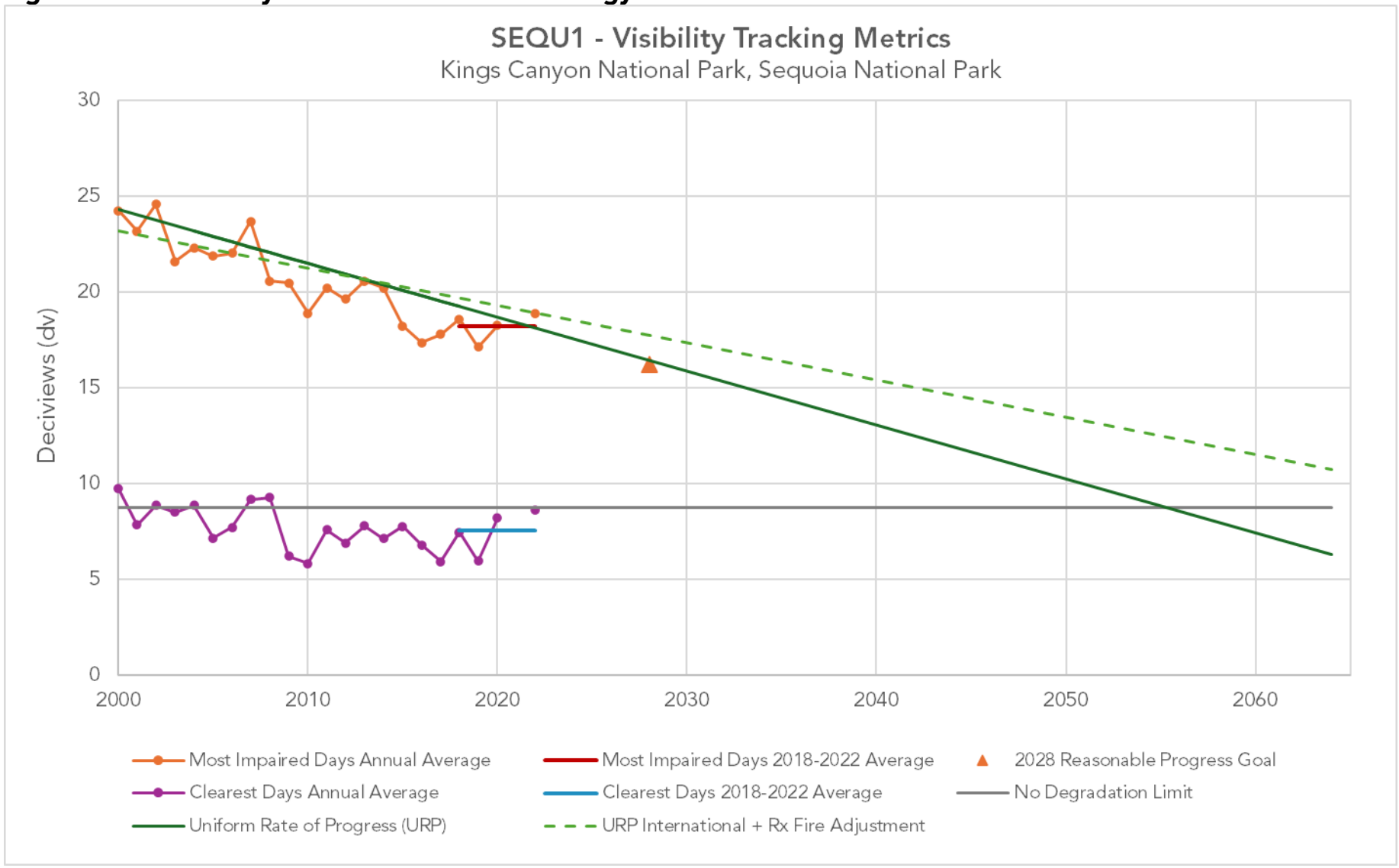


Figure Note: 2018-2022 averages were calculated based on 2018, 2019, 2020 and 2022 data. Data from 2021 were incomplete and not used in the calculation.

Figure A-11b: Visibility Conditions to Inform Strategy Assessment at SEQU

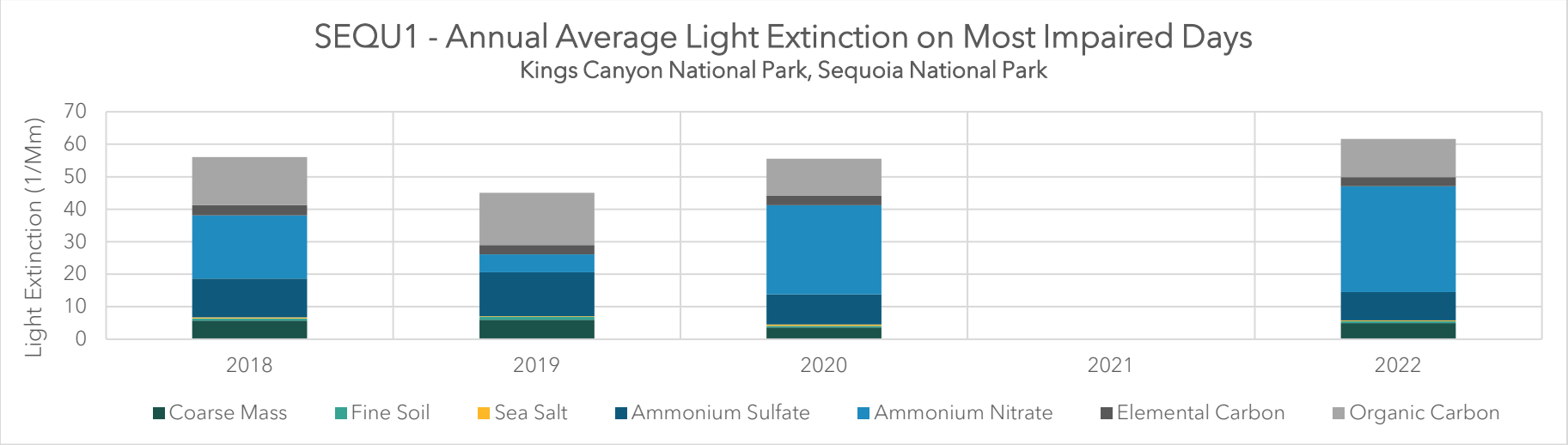


Figure A-11c: Visibility Conditions to Inform Strategy Assessment at SEQU

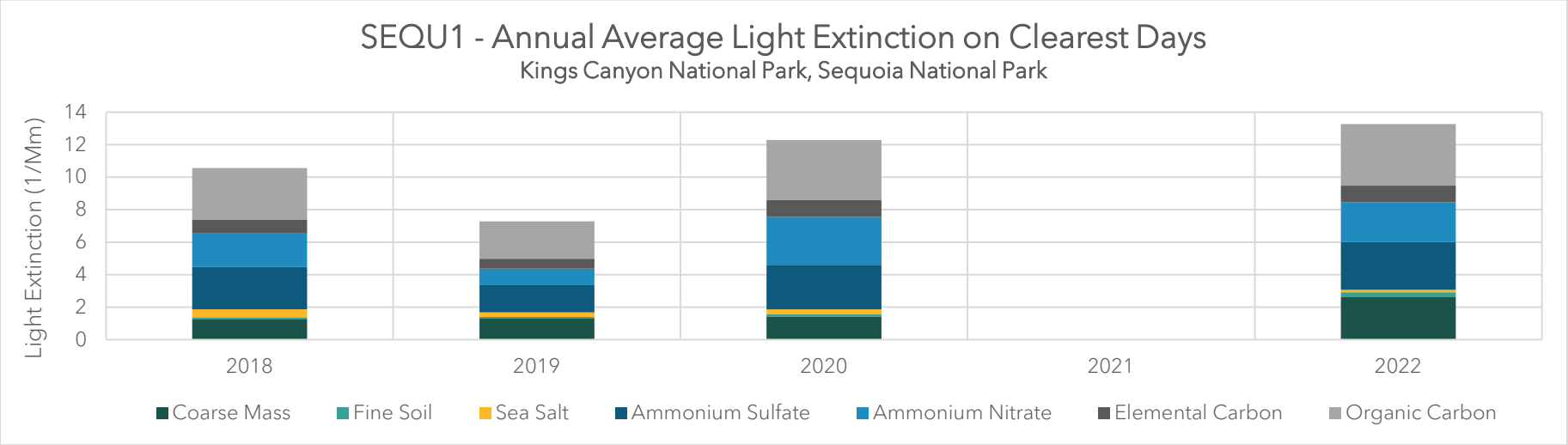


Figure A-12a: Visibility Conditions to Inform Strategy Assessment at RAFA

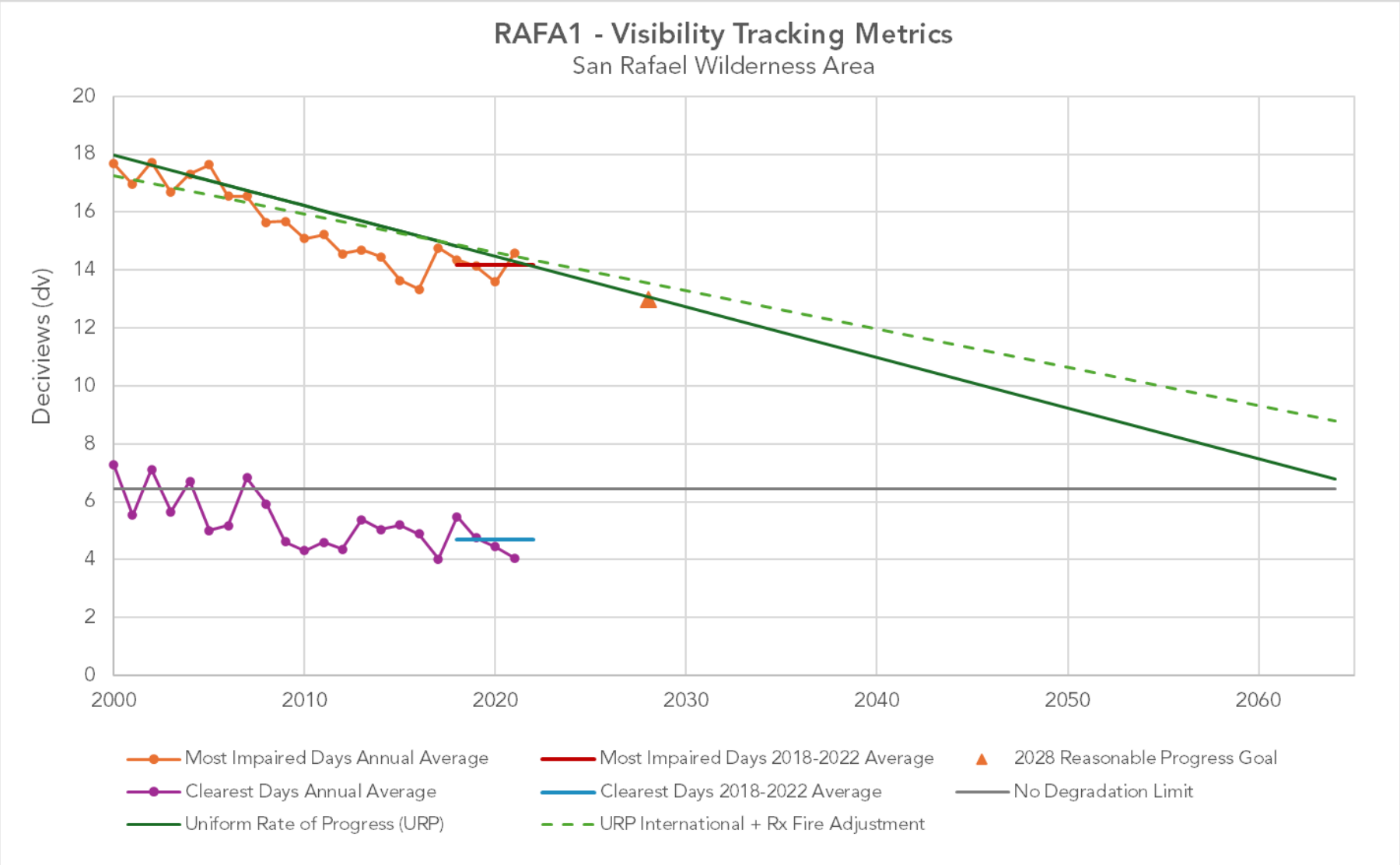


Figure Note: 2018-2022 averages were calculated based on 2018, 2019, 2020 and 2021 data. Data from 2022 were incomplete and not used in the calculation.

Figure A-12b: Visibility Conditions to Inform Strategy Assessment at RAFA

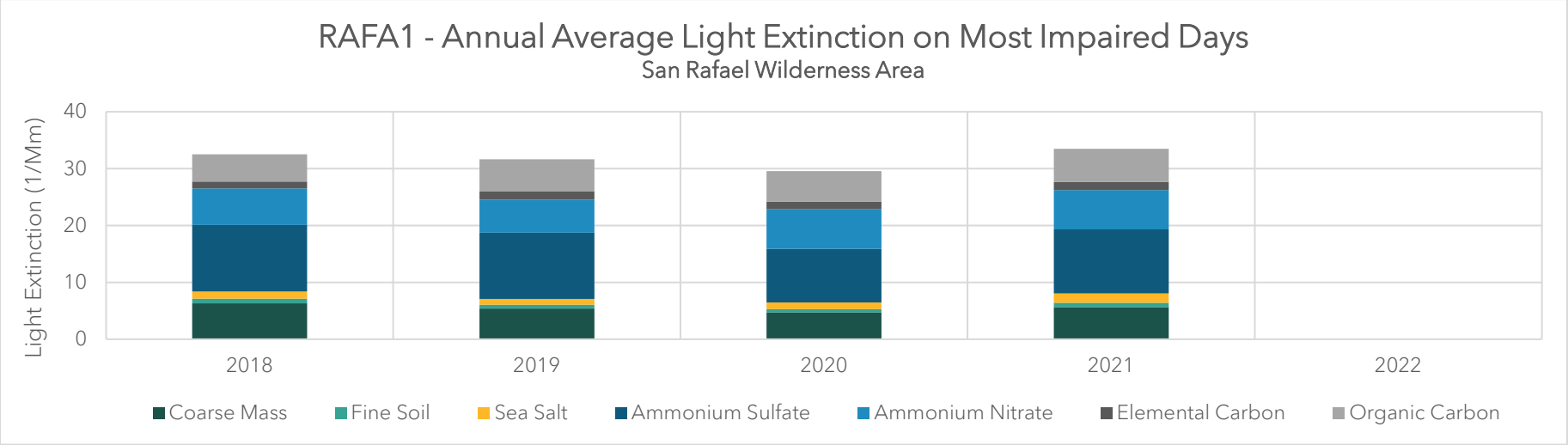


Figure A-12c: Visibility Conditions to Inform Strategy Assessment at RAFA

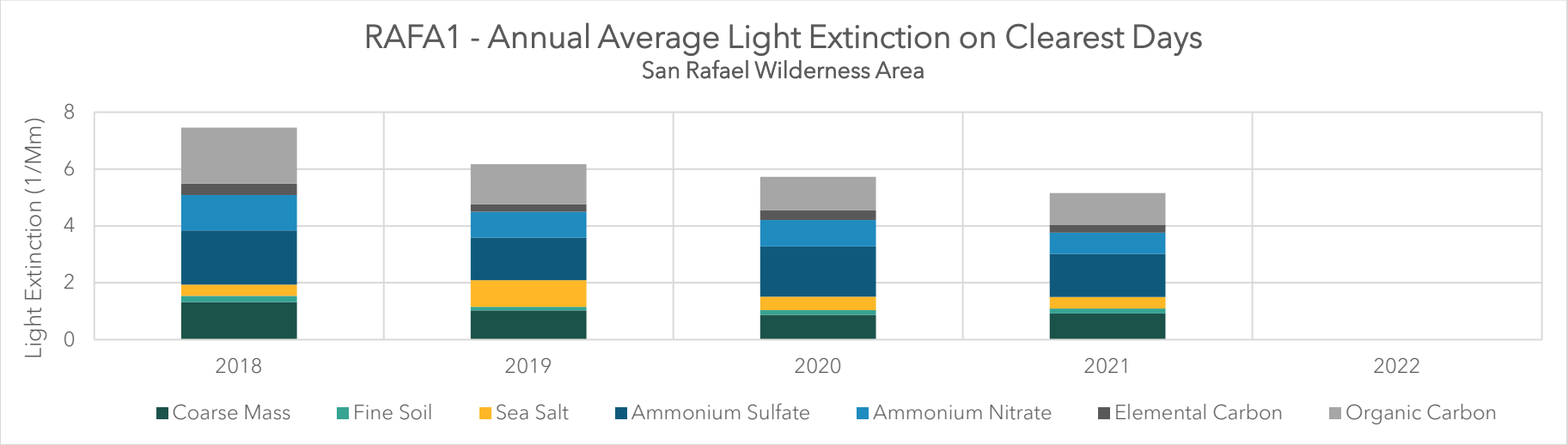


Figure A-13a: Visibility Conditions to Inform Strategy Assessment at DOME

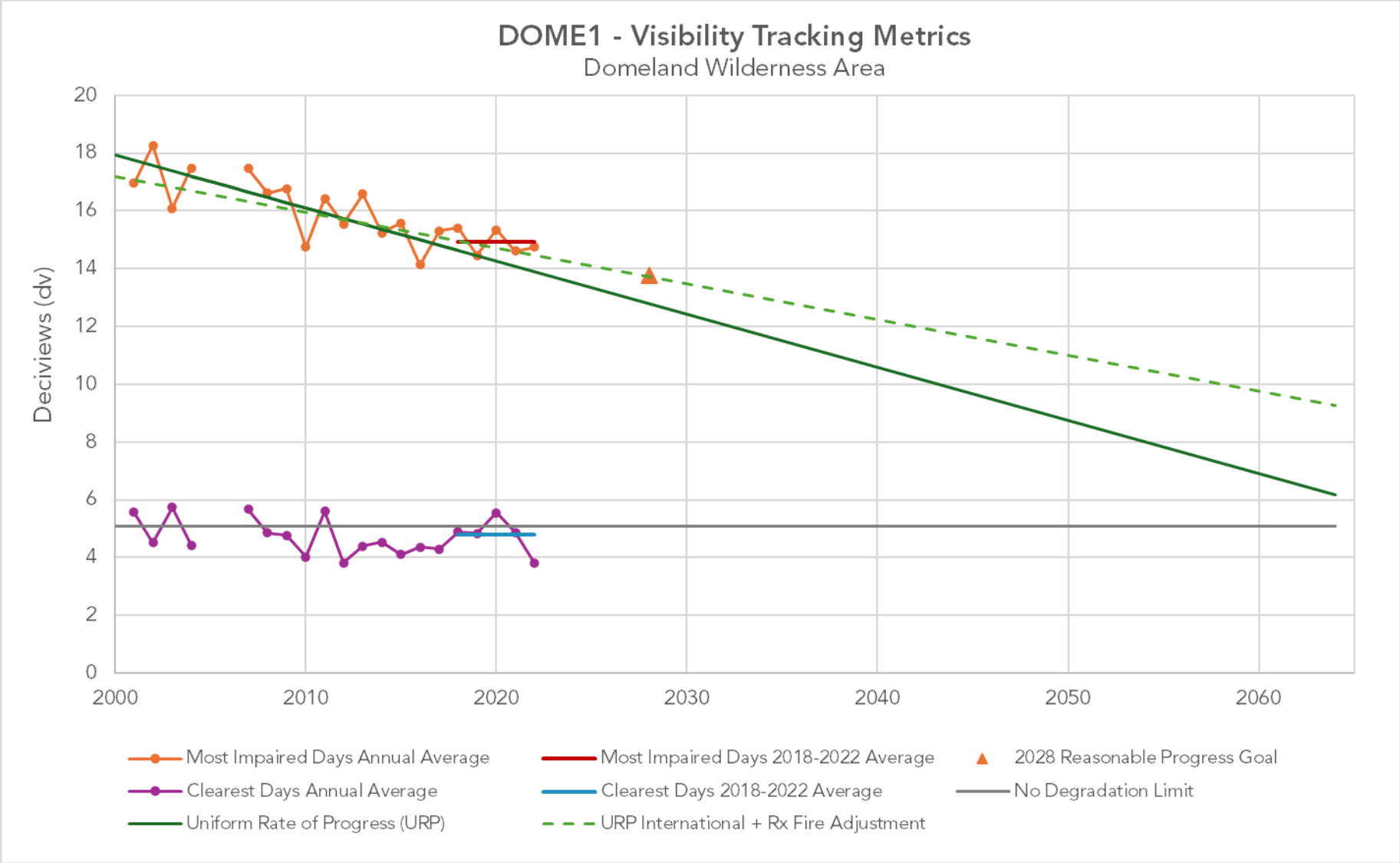


Figure A-13b: Visibility Conditions to Inform Strategy Assessment at DOME

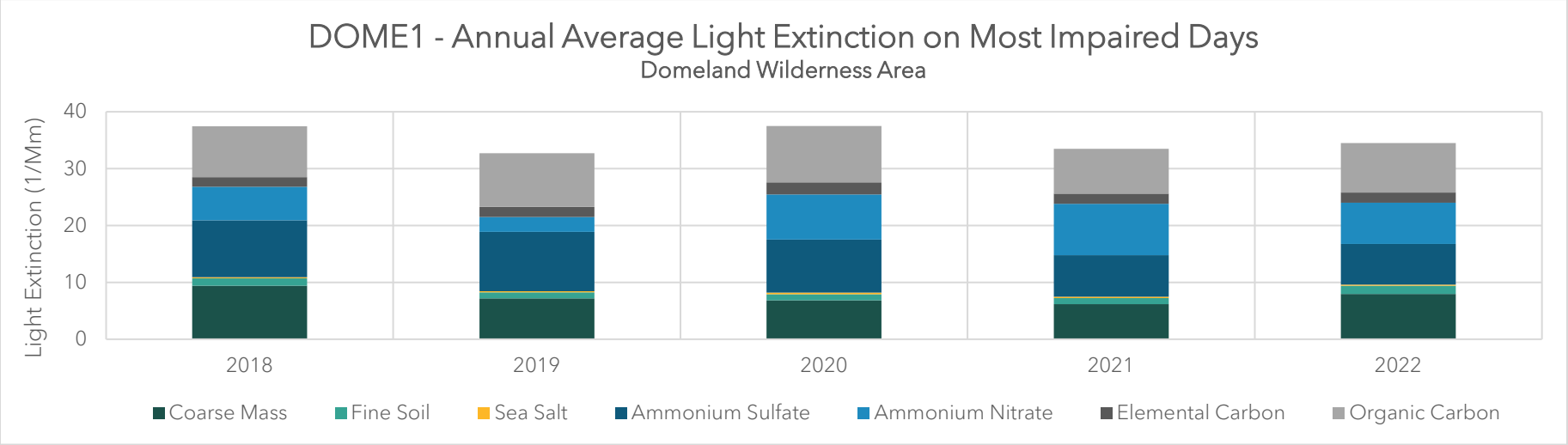


Figure A-13c: Visibility Conditions to Inform Strategy Assessment at DOME

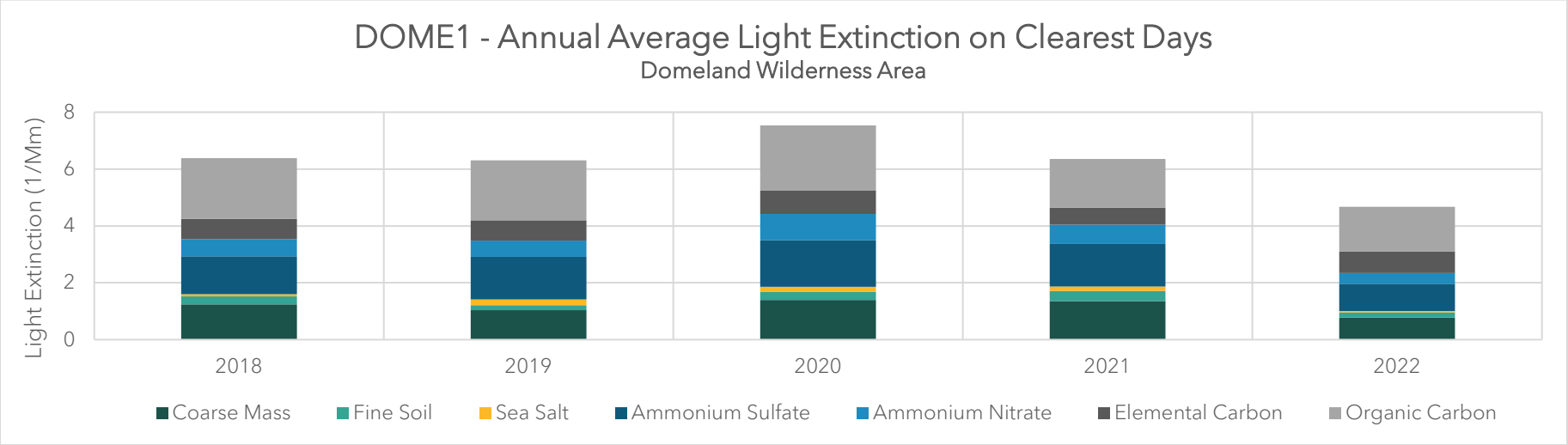


Figure A-14a: Visibility Conditions to Inform Strategy Assessment at SAGA

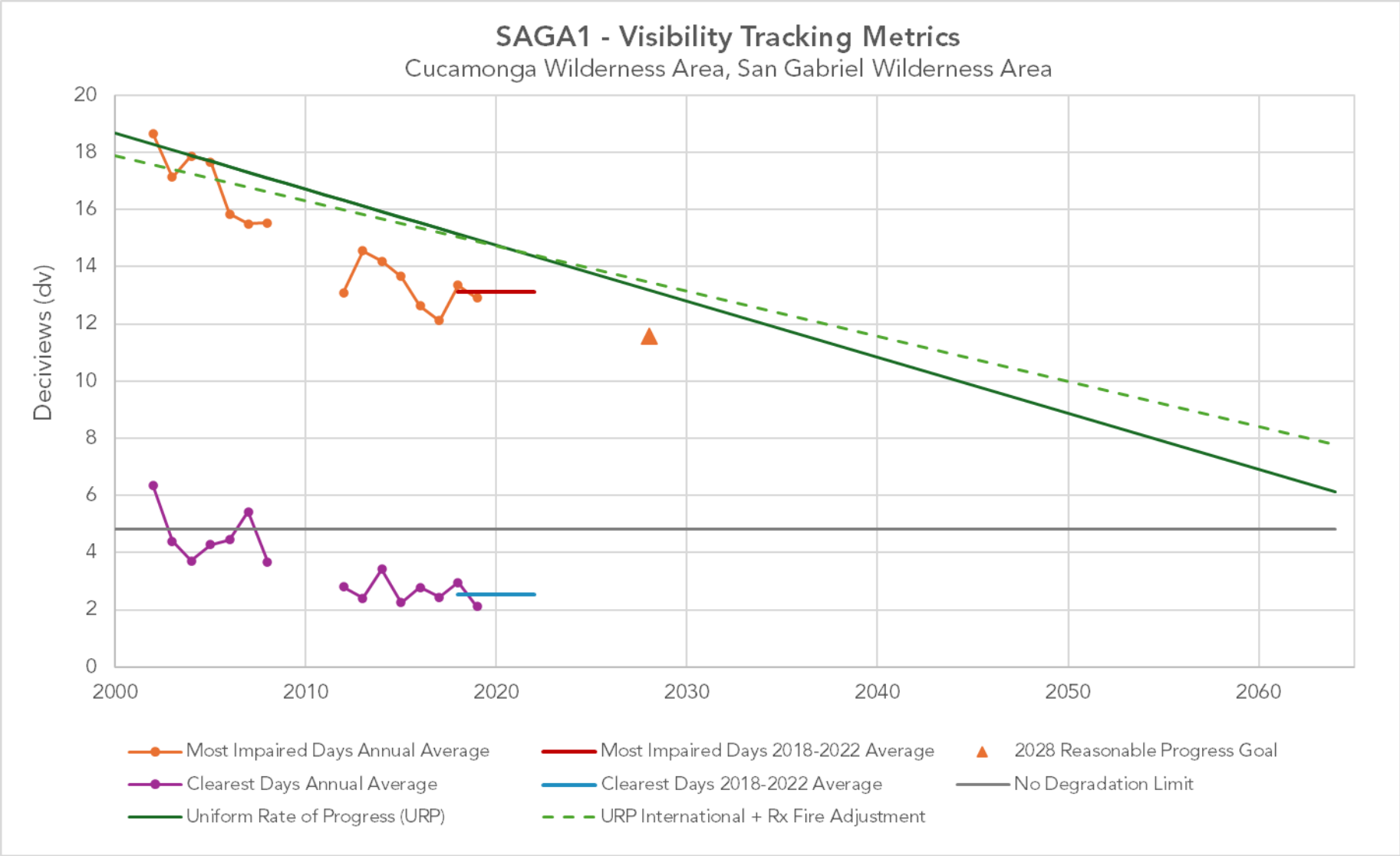


Figure Note: 2018-2022 averages were calculated based on 2018 and 2019 monitoring data. Data from 2020, 2021, and 2022 were incomplete and not used in the calculation.

Figure A-14b: Visibility Conditions to Inform Strategy Assessment at SAGA

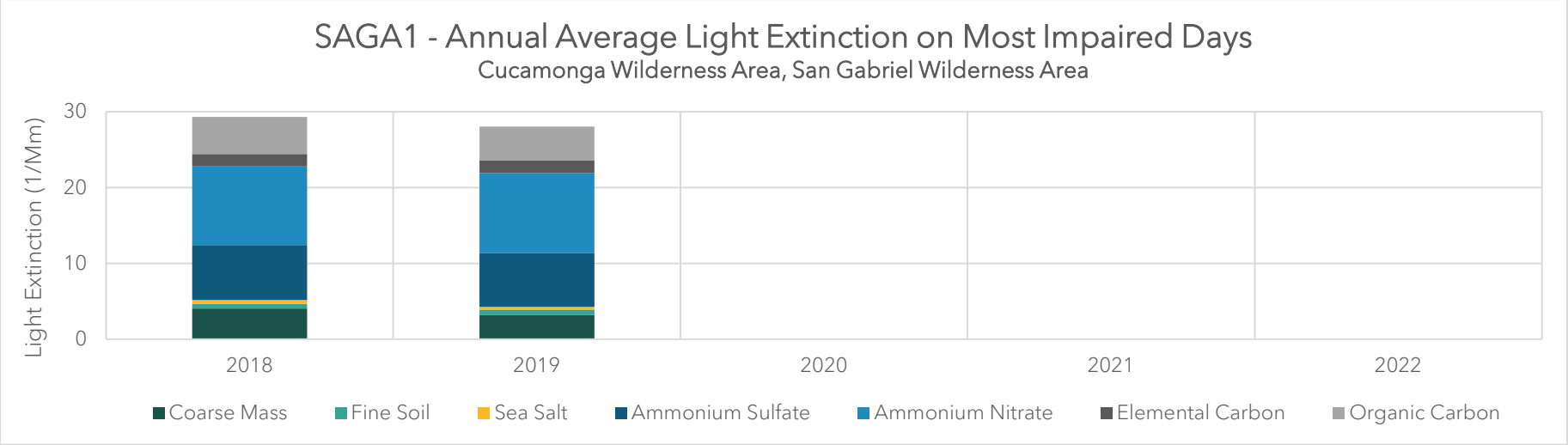


Figure A-14c: Visibility Conditions to Inform Strategy Assessment at SAGA

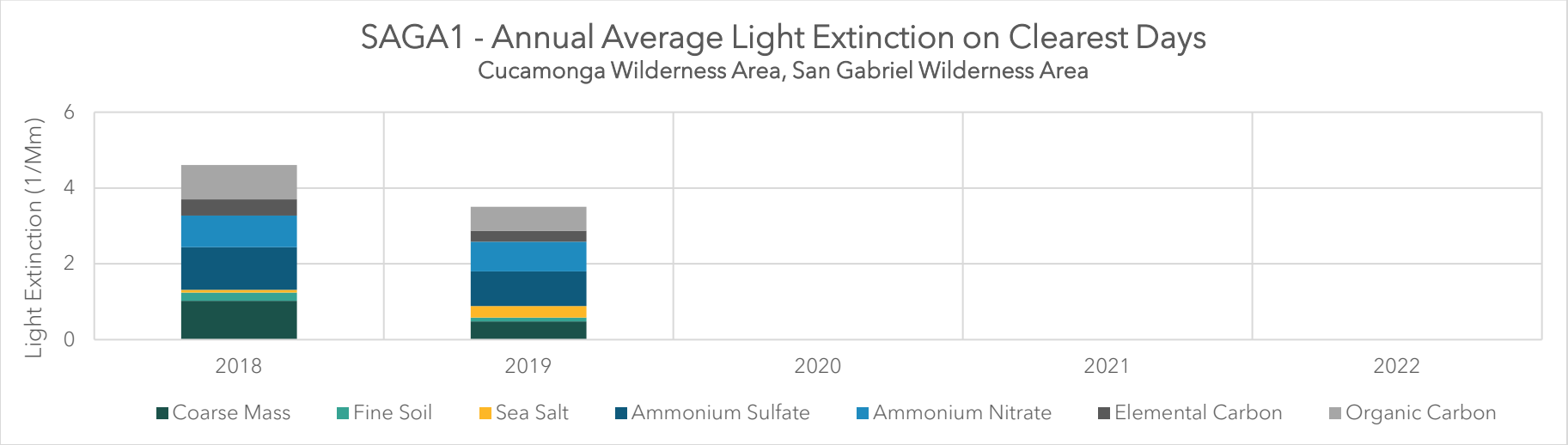


Figure A-15a: Visibility Conditions to Inform Strategy Assessment at SAGO

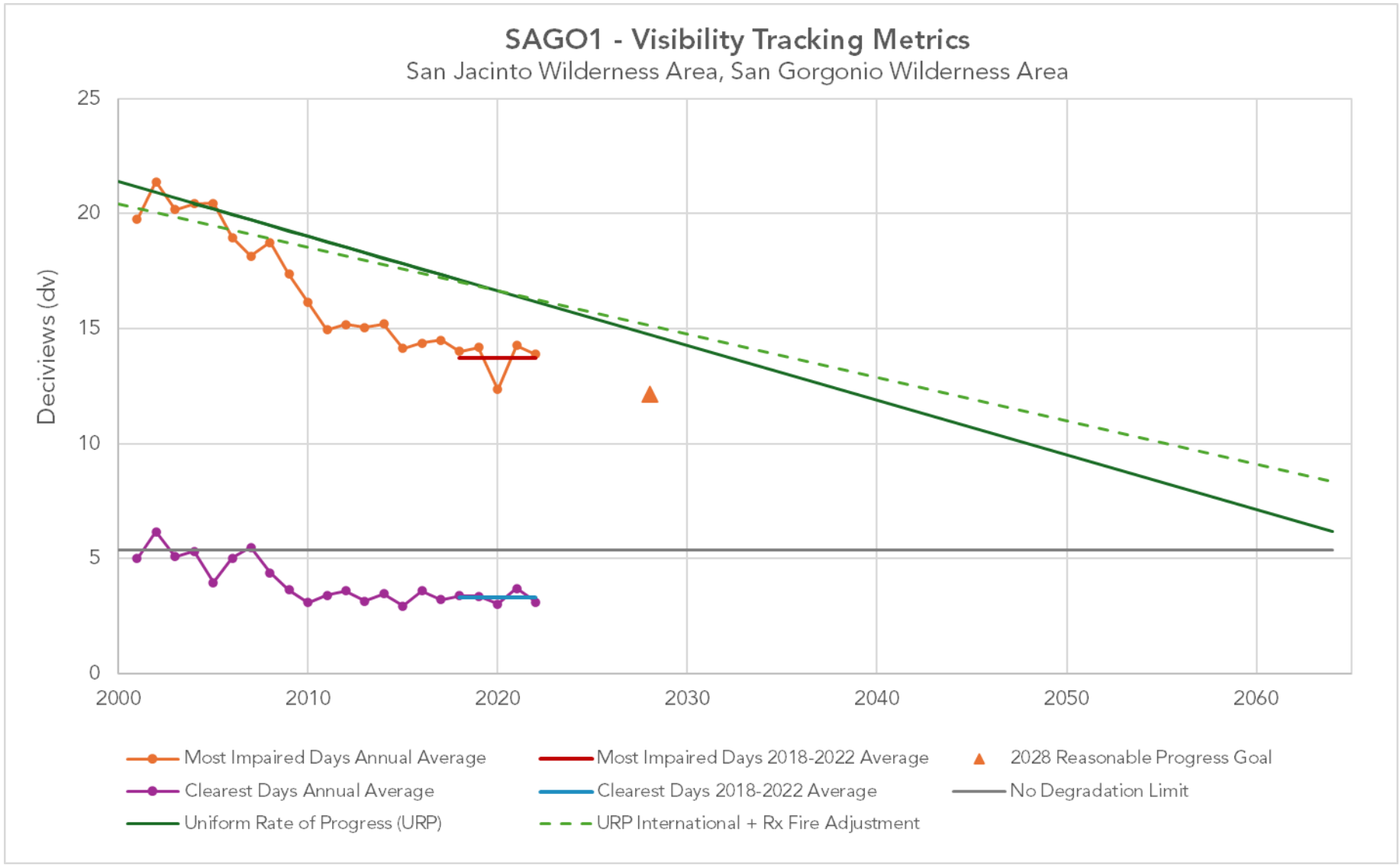


Figure A-15b: Visibility Conditions to Inform Strategy Assessment at SAGO

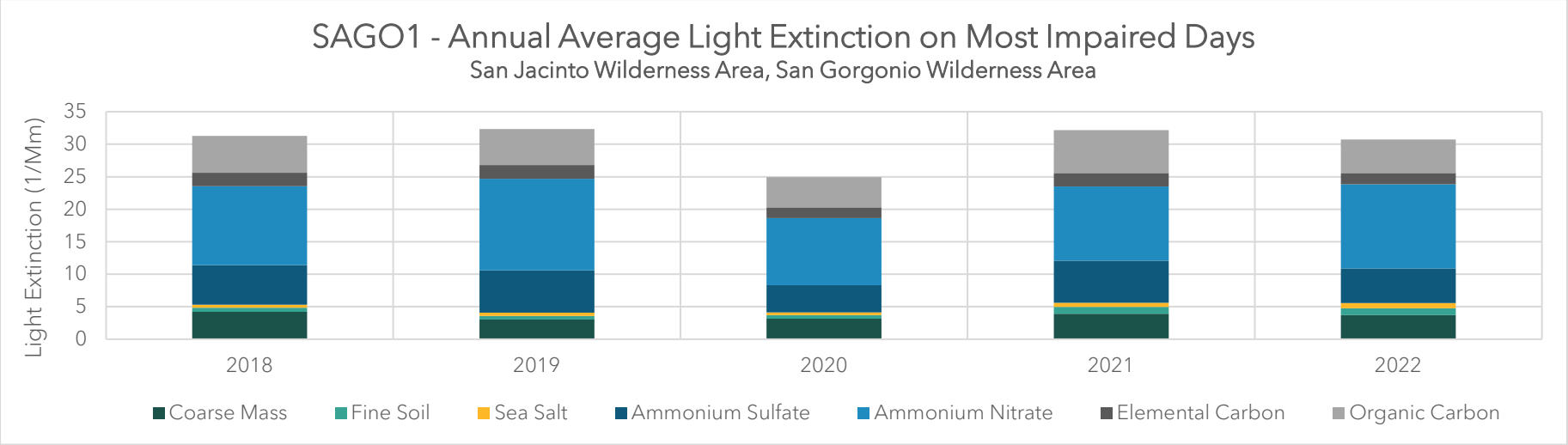


Figure A-15c: Visibility Conditions to Inform Strategy Assessment at SAGO

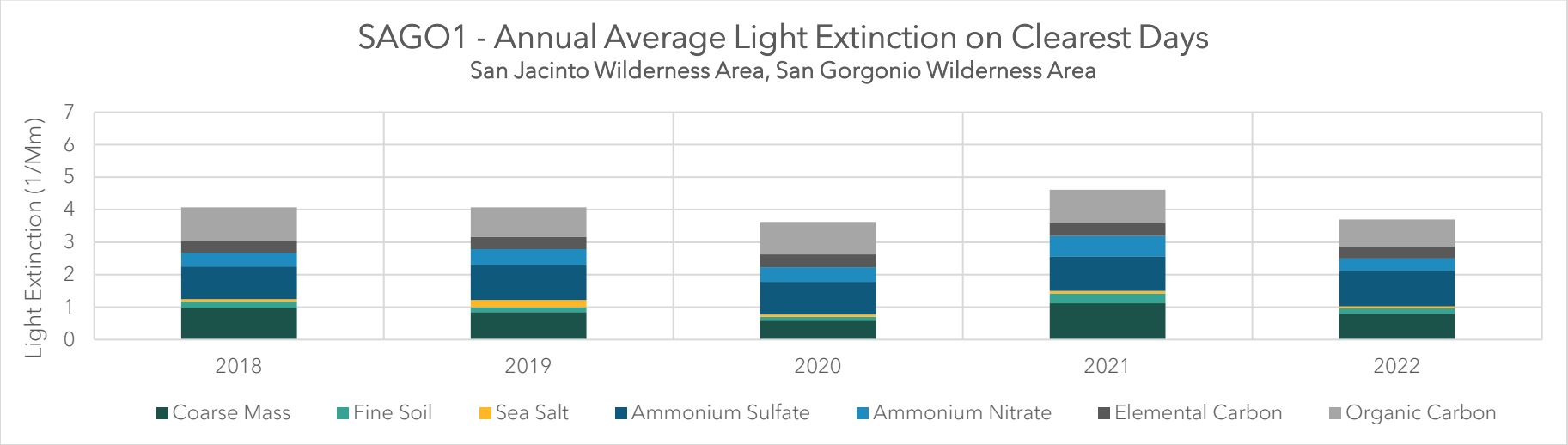


Figure A-16a: Visibility Conditions to Inform Strategy Assessment at JOSH

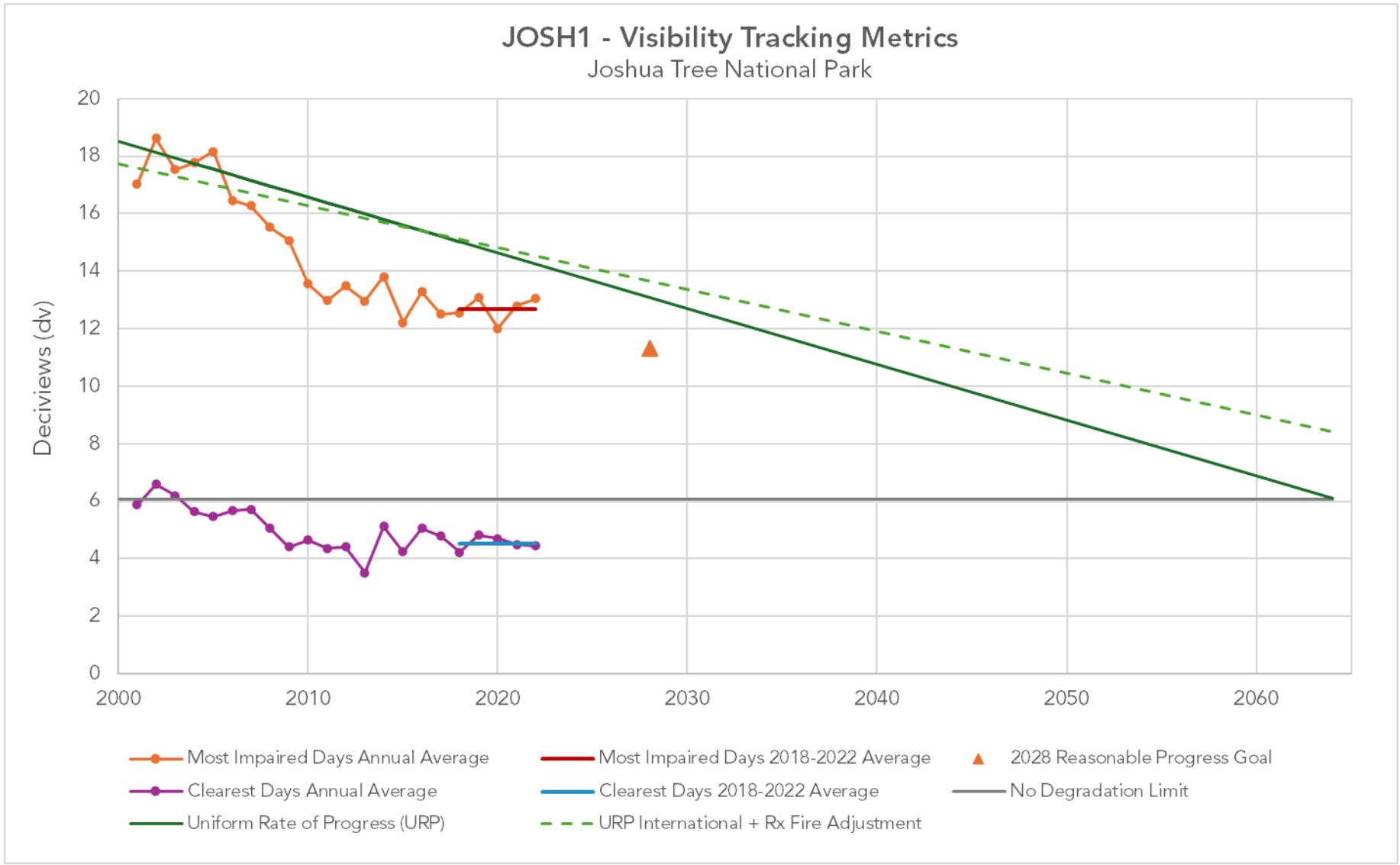


Figure A-16b: Visibility Conditions to Inform Strategy Assessment at JOSH

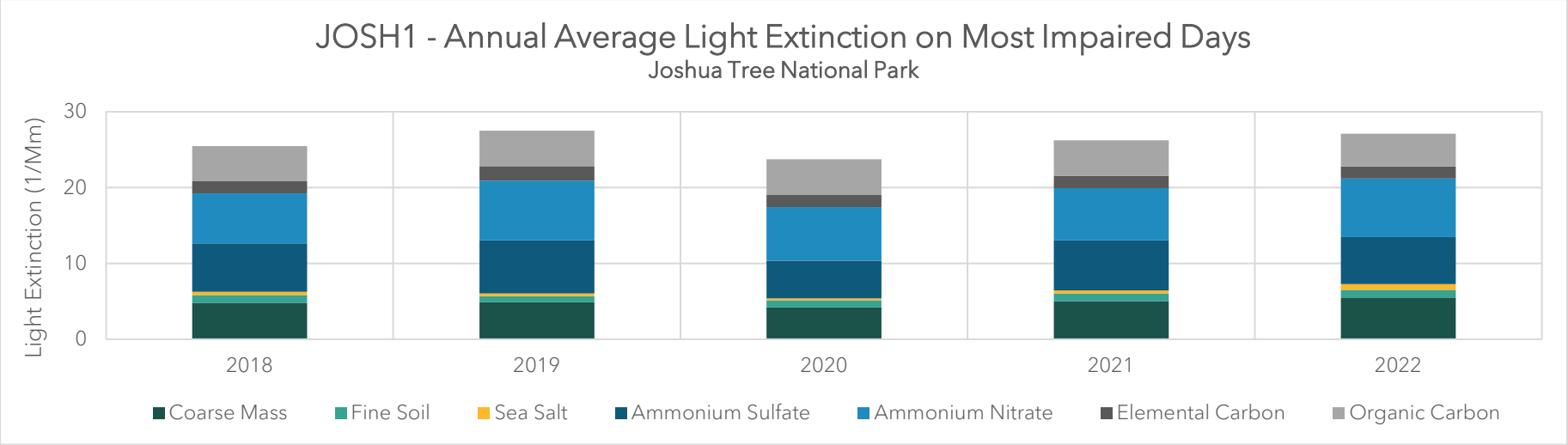


Figure A-16c: Visibility Conditions to Inform Strategy Assessment at JOSH

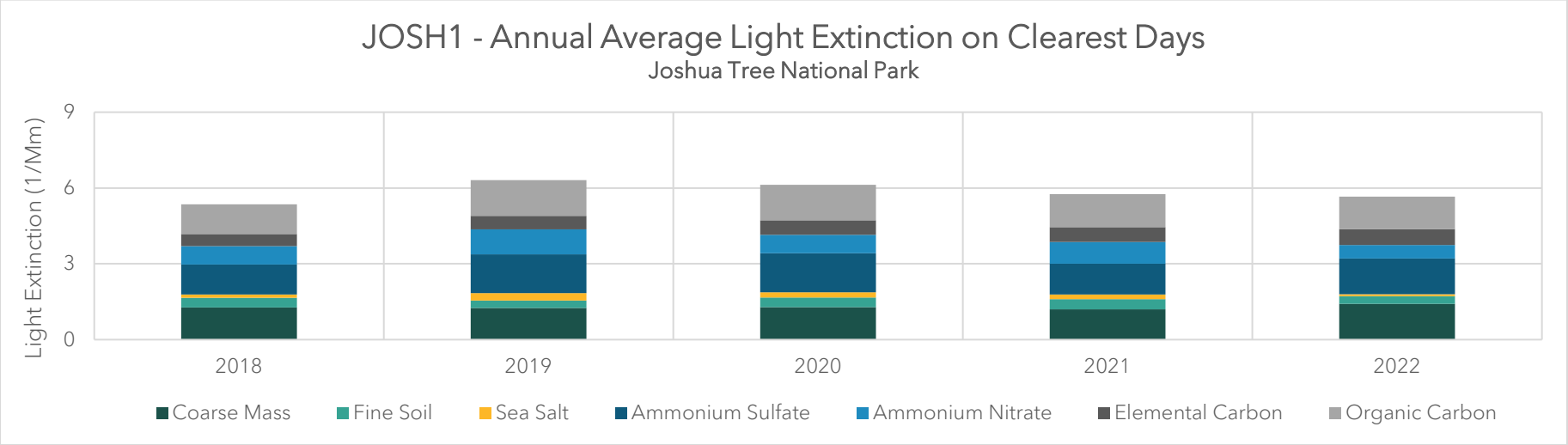


Figure A-17a: Visibility Conditions to Inform Strategy Assessment at AGTI

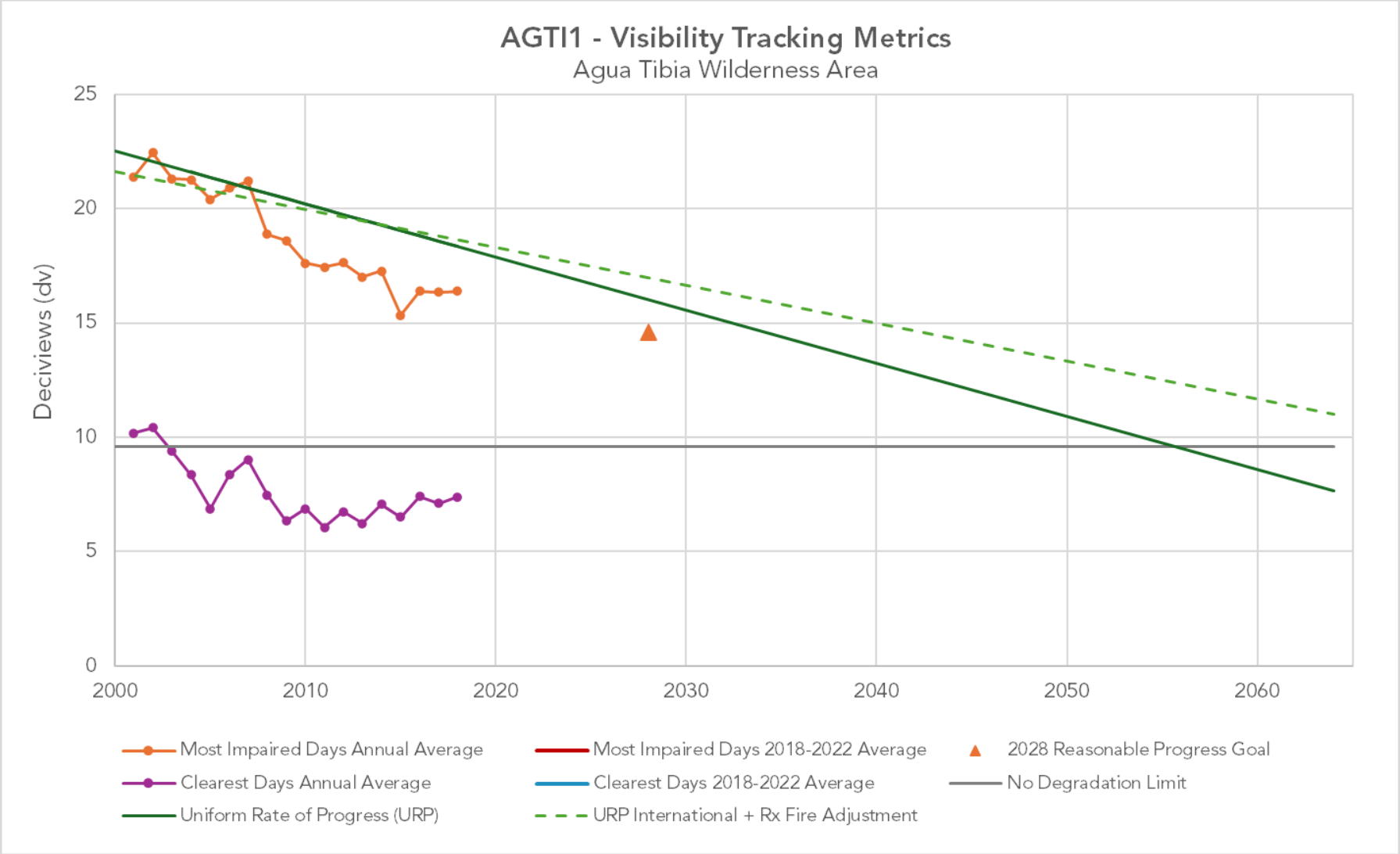


Figure Note: 2018-2022 averages could not be calculated because 2018 was the only year that had complete monitoring data available. Data for 2019-2022 were incomplete and could not be used in the calculation.

Figure A-17b: Visibility Conditions to Inform Strategy Assessment at AGTI

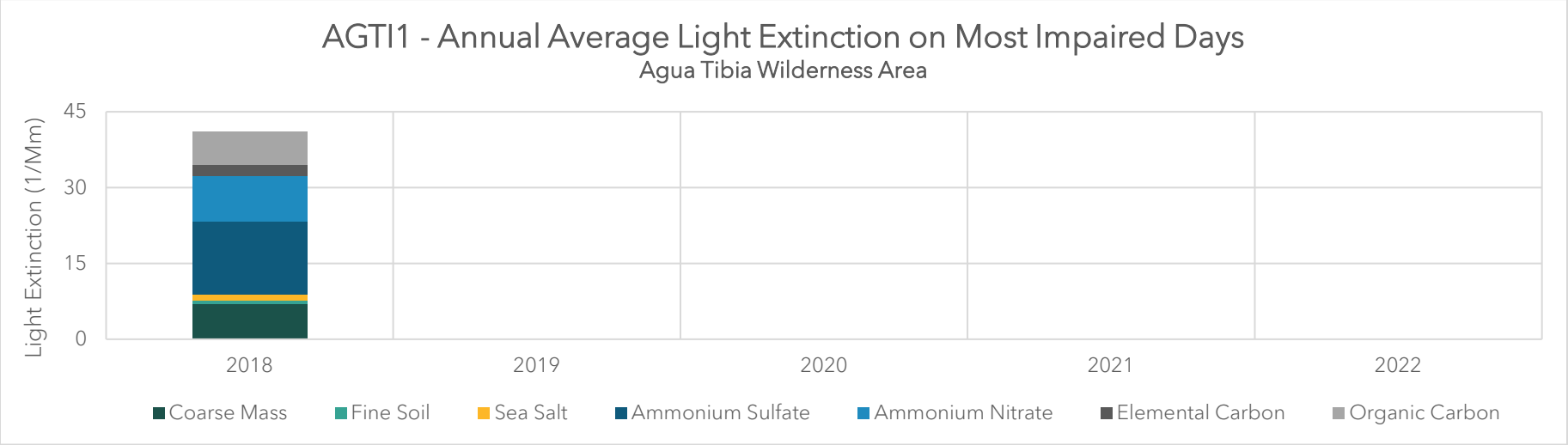


Figure A-17c: Visibility Conditions to Inform Strategy Assessment at AGTI

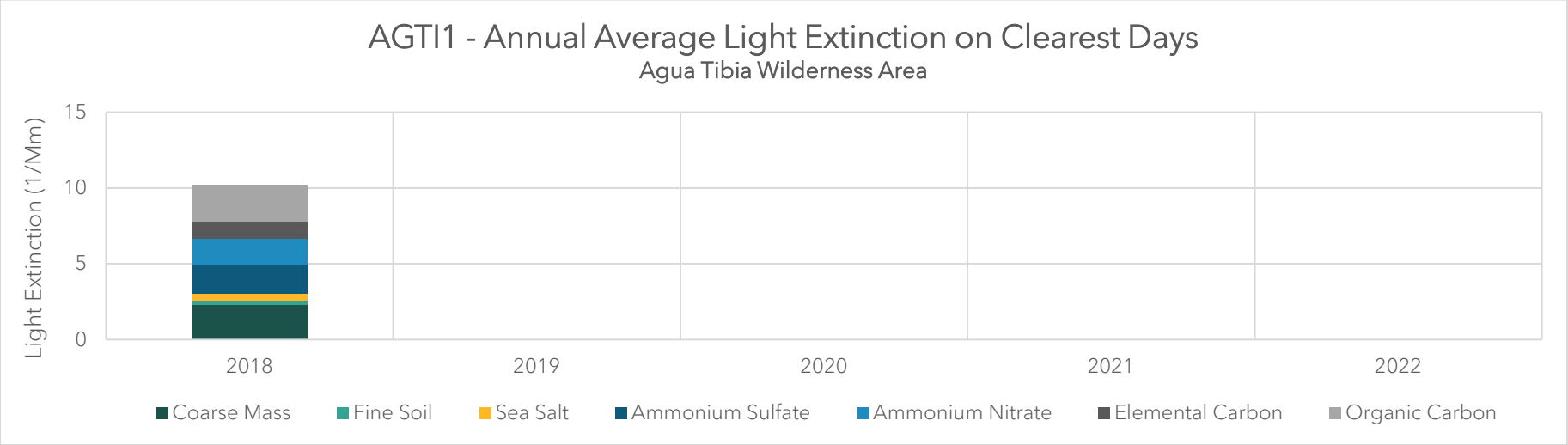


Table A-1: Statewide NOx Emissions

Summary Category Sub-Category Description	2017	2020	2023
Fuel Combustion Electric Utilities	13	17	15
Fuel Combustion Cogeneration	12	11	12
Fuel Combustion Oil & Gas Production	8	7	6
Fuel Combustion Petroleum Refining	19	18	15
Fuel Combustion Manufacturing & Industrial	44	43	43
Fuel Combustion Food and Agricultural Processing	11	10	9
Fuel Combustion Service and Commercial	35	36	37
Fuel Combustion Other	9	8	8
Waste Disposal Sewage Treatment	0	1	1
Waste Disposal Landfills	1	1	1
Waste Disposal Incinerators	2	2	2
Waste Disposal Soil Remediation	0	0	0
Waste Disposal Other	0	0	0
Cleaning & Surface Coatings Laundering	0	0	0
Cleaning & Surface Coatings Degreasing	0	0	0
Cleaning & Surface Coatings Coatings & Related Process Solvents	0	0	0
Cleaning & Surface Coatings Printing	0	0	0
Cleaning & Surface Coatings Adhesives and Sealants	0	0	0
Cleaning & Surface Coatings Other	0	0	0
Petroleum Production & Marketing Oil and Gas Production	2	2	2
Petroleum Production & Marketing Petroleum Refining	1	1	1
Petroleum Production & Marketing Petroleum Marketing	0	0	0
Petroleum Production & Marketing Other	0	0	0
Industrial Processes Chemical	2	2	2
Industrial Processes Food & Agriculture	0	0	0
Industrial Processes Mineral Processes	36	36	38

Summary Category Sub-Category Description	2017	2020	2023
Industrial Processes Metal Processes	0	0	0
Industrial Processes Wood and Paper	1	1	1
Industrial Processes Glass and Related Products	3	3	3
Industrial Processes Electronics	0	0	0
Industrial Processes Other	1	1	1
Total Stationary	**202**	**201**	**195**
Solvent Evaporation Consumer Products	0	0	0
Solvent Evaporation Architectural Coatings & Rel. Proc. Solvents	0	0	0
Solvent Evaporation Pesticides/Fertilizers	0	0	0
Solvent Evaporation Asphalt Paving/Roofing	0	0	0
Miscellaneous Processes Residential Fuel Combustion	55	56	53
Miscellaneous Processes Farming Operations	0	0	0
Miscellaneous Processes Construction and Demolition	0	0	0
Miscellaneous Processes Paved Road Dust	0	0	0
Miscellaneous Processes Unpaved Road Dust	0	0	0
Miscellaneous Processes Fugitive Windblown Dust	0	0	0
Miscellaneous Processes Fires	0	0	0
Miscellaneous Processes Managed Burning and Disposal	11	10	10
Miscellaneous Processes Cooking	0	0	0
Miscellaneous Processes Other	0	0	0
Total Areawide	**67**	**66**	**63**
On-Road Motor Vehicle Light Duty Passenger	68	45	34
On-Road Motor Vehicle Light Duty Trucks - 1	17	12	8
On-Road Motor Vehicle Light Duty Trucks 2	48	32	22
On-Road Motor Vehicle Medium Duty Trucks	43	29	19
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 1	10	8	6
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 2	1	1	1

Summary Category Sub-Category Description	2017	2020	2023
On-Road Motor Vehicle Medium Heavy Duty Gas Trucks	3	2	1
On-Road Motor Vehicle Heavy Heavy Duty Gas Trucks	0	0	0
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 1	52	38	27
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 2	13	10	7
On-Road Motor Vehicle Medium Heavy Duty Diesel Trucks	79	61	31
On-Road Motor Vehicle Heavy Heavy Duty Diesel Trucks	233	197	139
On-Road Motor Vehicle Motorcycles	7	7	7
On-Road Motor Vehicle Heavy Duty Diesel Urban Buses	4	2	1
On-Road Motor Vehicle Heavy Duty Gas Urban Buses	0	0	0
On-Road Motor Vehicle School Buses – Gas	0	0	0
On-Road Motor Vehicle School Buses – Diesel	8	7	7
On-Road Motor Vehicle Other Buses – Gas	1	1	0
On-Road Motor Vehicle Other Buses – Motor Coach – Diesel	2	2	1
On-Road Motor Vehicle All Other Buses – Diesel	3	2	1
On-Road Motor Vehicle Motor Homes	3	2	2
Other Mobile Sources Aircraft	47	49	53
Other Mobile Sources Trains	76	82	84
Other Mobile Sources Ships and Commercial Boats	0	0	0
Other Mobile Sources Ocean Going Vessels	194	196	201
Other Mobile Sources Commercial Harbor Craft	20	20	19
Other Mobile Sources Recreational Boats	20	19	18
Other Mobile Sources Off-Road Recreational Vehicles	1	1	1
Other Mobile Sources Off-Road Equipment	148	115	97
Other Mobile Sources Off-Road Equipment (PERP)	27	20	15
Other Mobile Sources Farm Equipment	80	64	53
Other Mobile Sources Fuel Storage and Handling	0	0	0
Total Mobile	**1208**	**1024**	**856**

Table A-2: Statewide ROG Emissions

Summary Category Sub-Category Description	2017	2020	2023
Fuel Combustion Electric Utilities	2	1	1
Fuel Combustion Cogeneration	3	2	2
Fuel Combustion Oil & Gas Production	2	1	1
Fuel Combustion Petroleum Refining	3	3	3
Fuel Combustion Manufacturing & Industrial	3	3	3
Fuel Combustion Food and Agricultural Processing	2	2	2
Fuel Combustion Service and Commercial	5	5	5
Fuel Combustion Other	2	1	1
Waste Disposal Sewage Treatment	1	1	1
Waste Disposal Landfills	16	16	16
Waste Disposal Incinerators	1	2	2
Waste Disposal Soil Remediation	0	0	0
Waste Disposal Other	34	32	32
Cleaning & Surface Coatings Laundering	1	1	1
Cleaning & Surface Coatings Degreasing	37	38	38
Cleaning & Surface Coatings Coatings & Related Process Solvents	56	58	59
Cleaning & Surface Coatings Printing	17	17	17
Cleaning & Surface Coatings Adhesives and Sealants	23	23	23
Cleaning & Surface Coatings Other	10	10	10
Petroleum Production & Marketing Oil and Gas Production	28	27	27
Petroleum Production & Marketing Petroleum Refining	13	11	11
Petroleum Production & Marketing Petroleum Marketing	55	54	52
Petroleum Production & Marketing Other	0	0	0
Industrial Processes Chemical	16	17	17
Industrial Processes Food & Agriculture	19	19	19
Industrial Processes Mineral Processes	5	4	4

Summary Category Sub-Category Description	2017	2020	2023
Industrial Processes Metal Processes	0	0	0
Industrial Processes Wood and Paper	2	2	2
Industrial Processes Glass and Related Products	0	0	0
Industrial Processes Electronics	0	0	0
Industrial Processes Other	15	15	15
Total Stationary	**371**	**367**	**366**
Solvent Evaporation Consumer Products	252	257	262
Solvent Evaporation Architectural Coatings & Rel. Proc. Solvents	43	43	44
Solvent Evaporation Pesticides/Fertilizers	42	40	43
Solvent Evaporation Asphalt Paving/Roofing	30	32	33
Miscellaneous Processes Residential Fuel Combustion	56	56	56
Miscellaneous Processes Farming Operations	126	126	125
Miscellaneous Processes Construction and Demolition	0	0	0
Miscellaneous Processes Paved Road Dust	0	0	0
Miscellaneous Processes Unpaved Road Dust	0	0	0
Miscellaneous Processes Fugitive Windblown Dust	0	0	0
Miscellaneous Processes Fires	1	1	1
Miscellaneous Processes Managed Burning and Disposal	29	41	32
Miscellaneous Processes Cooking	5	5	5
Miscellaneous Processes Other	2	2	2
Total Areawide	**588**	**604**	**603**
On-Road Motor Vehicle Light Duty Passenger	81	72	66
On-Road Motor Vehicle Light Duty Trucks - 1	23	20	19
On-Road Motor Vehicle Light Duty Trucks 2	43	40	38
On-Road Motor Vehicle Medium Duty Trucks	39	36	34
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 1	12	11	10
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 2	1	1	1

Summary Category Sub-Category Description	2017	2020	2023
On-Road Motor Vehicle Medium Heavy Duty Gas Trucks	2	1	1
On-Road Motor Vehicle Heavy Heavy Duty Gas Trucks	0	0	0
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 1	2	2	2
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 2	1	1	1
On-Road Motor Vehicle Medium Heavy Duty Diesel Trucks	5	5	4
On-Road Motor Vehicle Heavy Heavy Duty Diesel Trucks	11	9	8
On-Road Motor Vehicle Motorcycles	25	25	25
On-Road Motor Vehicle Heavy Duty Diesel Urban Buses	0	0	0
On-Road Motor Vehicle Heavy Duty Gas Urban Buses	0	0	0
On-Road Motor Vehicle School Buses – Gas	0	0	0
On-Road Motor Vehicle School Buses – Diesel	0	0	0
On-Road Motor Vehicle Other Buses – Gas	0	0	0
On-Road Motor Vehicle Other Buses – Motor Coach – Diesel	0	0	0
On-Road Motor Vehicle All Other Buses – Diesel	0	0	0
On-Road Motor Vehicle Motor Homes	0	0	0
Other Mobile Sources Aircraft	27	27	27
Other Mobile Sources Trains	3	4	4
Other Mobile Sources Ships and Commercial Boats	0	0	0
Other Mobile Sources Ocean Going Vessels	17	17	17
Other Mobile Sources Commercial Harbor Craft	2	2	3
Other Mobile Sources Recreational Boats	104	100	95
Other Mobile Sources Off-Road Recreational Vehicles	15	14	14
Other Mobile Sources Off-Road Equipment	130	127	125
Other Mobile Sources Off-Road Equipment (PERP)	2	2	2
Other Mobile Sources Farm Equipment	15	15	14
Other Mobile Sources Fuel Storage and Handling	14	13	13
Total Mobile	**577**	**548**	**524**

Table A-3: Statewide SOx Emissions

Summary Category Sub-Category Description	2017	2020	2023
Fuel Combustion Electric Utilities	1	2	2
Fuel Combustion Cogeneration	1	1	1
Fuel Combustion Oil & Gas Production	1	1	1
Fuel Combustion Petroleum Refining	7	8	8
Fuel Combustion Manufacturing & Industrial	9	8	8
Fuel Combustion Food and Agricultural Processing	1	1	1
Fuel Combustion Service and Commercial	2	2	2
Fuel Combustion Other	0	0	0
Waste Disposal Sewage Treatment	0	0	0
Waste Disposal Landfills	1	1	1
Waste Disposal Incinerators	1	1	1
Waste Disposal Soil Remediation	0	0	0
Waste Disposal Other	0	0	0
Cleaning & Surface Coatings Laundering	0	0	0
Cleaning & Surface Coatings Degreasing	0	0	0
Cleaning & Surface Coatings Coatings & Related Process Solvents	0	0	0
Cleaning & Surface Coatings Printing	0	0	0
Cleaning & Surface Coatings Adhesives and Sealants	0	0	0
Cleaning & Surface Coatings Other	0	0	0
Petroleum Production & Marketing Oil and Gas Production	1	1	1
Petroleum Production & Marketing Petroleum Refining	3	3	3
Petroleum Production & Marketing Petroleum Marketing	0	0	0
Petroleum Production & Marketing Other	0	0	0
Industrial Processes Chemical	2	2	2
Industrial Processes Food & Agriculture	1	1	1
Industrial Processes Mineral Processes	13	13	13

Summary Category Sub-Category Description	2017	2020	2023
Industrial Processes Metal Processes	0	0	0
Industrial Processes Wood and Paper	0	0	0
Industrial Processes Glass and Related Products	1	1	1
Industrial Processes Electronics	0	0	0
Industrial Processes Other	0	0	0
Total Stationary	**44**	**44**	**45**
Solvent Evaporation Consumer Products	0	0	0
Solvent Evaporation Architectural Coatings & Rel. Proc. Solvents	0	0	0
Solvent Evaporation Pesticides/Fertilizers	0	0	0
Solvent Evaporation Asphalt Paving/Roofing	0	0	0
Miscellaneous Processes Residential Fuel Combustion	2	2	2
Miscellaneous Processes Farming Operations	0	0	0
Miscellaneous Processes Construction and Demolition	0	0	0
Miscellaneous Processes Paved Road Dust	0	0	0
Miscellaneous Processes Unpaved Road Dust	0	0	0
Miscellaneous Processes Fugitive Windblown Dust	0	0	0
Miscellaneous Processes Fires	0	0	0
Miscellaneous Processes Managed Burning and Disposal	2	2	2
Miscellaneous Processes Cooking	0	0	0
Miscellaneous Processes Other	0	0	0
Total Areawide	**4**	**5**	**4**
On-Road Motor Vehicle Light Duty Passenger	2	2	2
On-Road Motor Vehicle Light Duty Trucks - 1	0	0	0
On-Road Motor Vehicle Light Duty Trucks 2	1	1	1
On-Road Motor Vehicle Medium Duty Trucks	1	1	1
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 1	0	0	0
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 2	0	0	0

Summary Category Sub-Category Description	2017	2020	2023
On-Road Motor Vehicle Medium Heavy Duty Gas Trucks	0	0	0
On-Road Motor Vehicle Heavy Heavy Duty Gas Trucks	0	0	0
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 1	0	0	0
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 2	0	0	0
On-Road Motor Vehicle Medium Heavy Duty Diesel Trucks	0	0	0
On-Road Motor Vehicle Heavy Heavy Duty Diesel Trucks	1	1	1
On-Road Motor Vehicle Motorcycles	0	0	0
On-Road Motor Vehicle Heavy Duty Diesel Urban Buses	0	0	0
On-Road Motor Vehicle Heavy Duty Gas Urban Buses	0	0	0
On-Road Motor Vehicle School Buses – Gas	0	0	0
On-Road Motor Vehicle School Buses – Diesel	0	0	0
On-Road Motor Vehicle Other Buses – Gas	0	0	0
On-Road Motor Vehicle Other Buses – Motor Coach – Diesel	0	0	0
On-Road Motor Vehicle All Other Buses – Diesel	0	0	0
On-Road Motor Vehicle Motor Homes	0	0	0
Other Mobile Sources Aircraft	5	5	5
Other Mobile Sources Trains	0	0	0
Other Mobile Sources Ships and Commercial Boats	0	0	0
Other Mobile Sources Ocean Going Vessels	7	7	7
Other Mobile Sources Commercial Harbor Craft	0	0	0
Other Mobile Sources Recreational Boats	0	0	0
Other Mobile Sources Off-Road Recreational Vehicles	0	0	0
Other Mobile Sources Off-Road Equipment	0	0	0
Other Mobile Sources Off-Road Equipment (PERP)	0	0	0
Other Mobile Sources Farm Equipment	0	0	0
Other Mobile Sources Fuel Storage and Handling	0	0	0
Total Mobile	**17**	**17**	**17**

Table A-4: Statewide PM2.5 Emissions

Summary Category Sub-Category Description	2017	2020	2023
Fuel Combustion Electric Utilities	4	5	4
Fuel Combustion Cogeneration	2	2	2
Fuel Combustion Oil & Gas Production	2	1	1
Fuel Combustion Petroleum Refining	4	4	4
Fuel Combustion Manufacturing & Industrial	4	4	4
Fuel Combustion Food and Agricultural Processing	1	1	1
Fuel Combustion Service and Commercial	4	4	4
Fuel Combustion Other	1	1	1
Waste Disposal Sewage Treatment	0	0	0
Waste Disposal Landfills	1	1	1
Waste Disposal Incinerators	0	0	0
Waste Disposal Soil Remediation	0	0	0
Waste Disposal Other	0	0	0
Cleaning & Surface Coatings Laundering	0	0	0
Cleaning & Surface Coatings Degreasing	0	0	0
Cleaning & Surface Coatings Coatings & Related Process Solvents	2	2	2
Cleaning & Surface Coatings Printing	0	0	0
Cleaning & Surface Coatings Adhesives and Sealants	0	0	0
Cleaning & Surface Coatings Other	0	0	0
Petroleum Production & Marketing Oil and Gas Production	0	0	0
Petroleum Production & Marketing Petroleum Refining	3	3	3
Petroleum Production & Marketing Petroleum Marketing	0	0	0
Petroleum Production & Marketing Other	0	0	0
Industrial Processes Chemical	2	1	1
Industrial Processes Food & Agriculture	3	3	3
Industrial Processes Mineral Processes	13	14	14

Summary Category Sub-Category Description	2017	2020	2023
Industrial Processes Metal Processes	1	1	1
Industrial Processes Wood and Paper	7	7	7
Industrial Processes Glass and Related Products	0	0	0
Industrial Processes Electronics	0	0	0
Industrial Processes Other	3	2	2
Total Stationary	**58**	**58**	**57**
Solvent Evaporation Consumer Products	0	0	0
Solvent Evaporation Architectural Coatings & Rel. Proc. Solvents	0	0	0
Solvent Evaporation Pesticides/Fertilizers	0	0	0
Solvent Evaporation Asphalt Paving/Roofing	0	0	0
Miscellaneous Processes Residential Fuel Combustion	48	48	48
Miscellaneous Processes Farming Operations	21	21	21
Miscellaneous Processes Construction and Demolition	18	19	20
Miscellaneous Processes Paved Road Dust	27	27	27
Miscellaneous Processes Unpaved Road Dust	25	27	27
Miscellaneous Processes Fugitive Windblown Dust	49	49	49
Miscellaneous Processes Fires	1	1	1
Miscellaneous Processes Managed Burning and Disposal	34	47	37
Miscellaneous Processes Cooking	27	28	28
Miscellaneous Processes Other	0	0	0
Total Areawide	**252**	**268**	**259**
On-Road Motor Vehicle Light Duty Passenger	11	11	11
On-Road Motor Vehicle Light Duty Trucks - 1	1	1	1
On-Road Motor Vehicle Light Duty Trucks 2	4	4	4
On-Road Motor Vehicle Medium Duty Trucks	3	3	3
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 1	1	1	1
On-Road Motor Vehicle Light Heavy Duty Gas Trucks - 2	0	0	0

Summary Category Sub-Category Description	2017	2020	2023
On-Road Motor Vehicle Medium Heavy Duty Gas Trucks	0	0	0
On-Road Motor Vehicle Heavy Heavy Duty Gas Trucks	0	0	0
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 1	1	1	1
On-Road Motor Vehicle Light Heavy Duty Diesel Trucks - 2	0	0	0
On-Road Motor Vehicle Medium Heavy Duty Diesel Trucks	3	3	3
On-Road Motor Vehicle Heavy Heavy Duty Diesel Trucks	6	5	5
On-Road Motor Vehicle Motorcycles	0	0	0
On-Road Motor Vehicle Heavy Duty Diesel Urban Buses	0	0	0
On-Road Motor Vehicle Heavy Duty Gas Urban Buses	0	0	0
On-Road Motor Vehicle School Buses – Gas	0	0	0
On-Road Motor Vehicle School Buses – Diesel	0	0	0
On-Road Motor Vehicle Other Buses – Gas	0	0	0
On-Road Motor Vehicle Other Buses – Motor Coach – Diesel	0	0	0
On-Road Motor Vehicle All Other Buses – Diesel	0	0	0
On-Road Motor Vehicle Motor Homes	0	0	0
Other Mobile Sources Aircraft	9	8	8
Other Mobile Sources Trains	2	2	2
Other Mobile Sources Ships and Commercial Boats	0	0	0
Other Mobile Sources Ocean Going Vessels	3	3	3
Other Mobile Sources Commercial Harbor Craft	1	1	1
Other Mobile Sources Recreational Boats	5	4	4
Other Mobile Sources Off-Road Recreational Vehicles	0	0	0
Other Mobile Sources Off-Road Equipment	7	6	6
Other Mobile Sources Off-Road Equipment (PERP)	1	1	1
Other Mobile Sources Farm Equipment	5	4	4
Other Mobile Sources Fuel Storage and Handling	0	0	0
Total Mobile	**372**	**384**	**374**

Appendix B: Public Comment

Statutory Requirements

Section 51.308(g) requires the draft progress report to be made available for public comment for at least 30 days. When the progress report is submitted to EPA, all comments received from the public must be submitted along with an explanation of any changes made to the report in response to comments received.

On December 26, 2024, CARB published the draft progress report on its regional haze webpage for 30-day public review and notified the public of the availability of the draft document via listserv email. CARB invited the public to submit any comments on the draft to staff via email. CARB did not receive any public comments.