# ARR Data Hub Update: What Practitioners Need to Know

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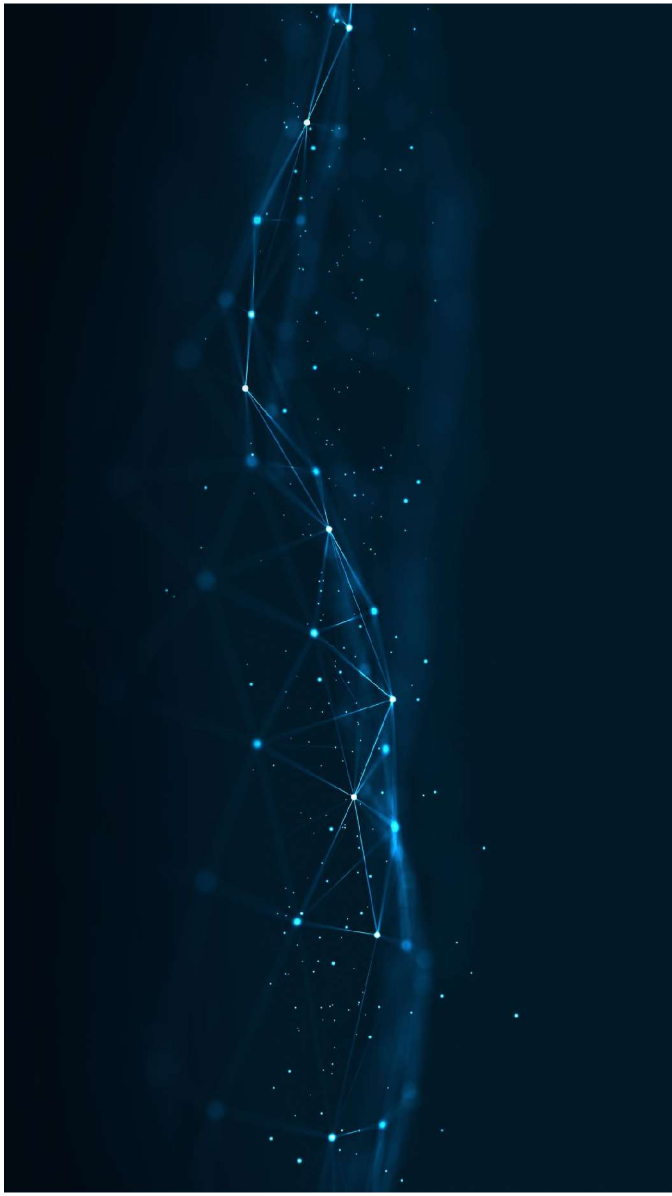
Panelists: Duncan McLuckie, Giancarlo Bonotto, Monique Retallick

# Introduction

- First major update to the datahub
- Two different jurisdictions wanted substantive changes to the datahub for their region
  - NSW has new pre-burst and loss recommendations
  - SEQ has updated IFDs and jurisdiction specific IFD guidelines
- Also took the opportunity to:
  - Include IFDs everywhere (historic, current-2030 and future)
  - Update software
  - Improve security
  - Better user experience



# History of Datahub – How did we get here?

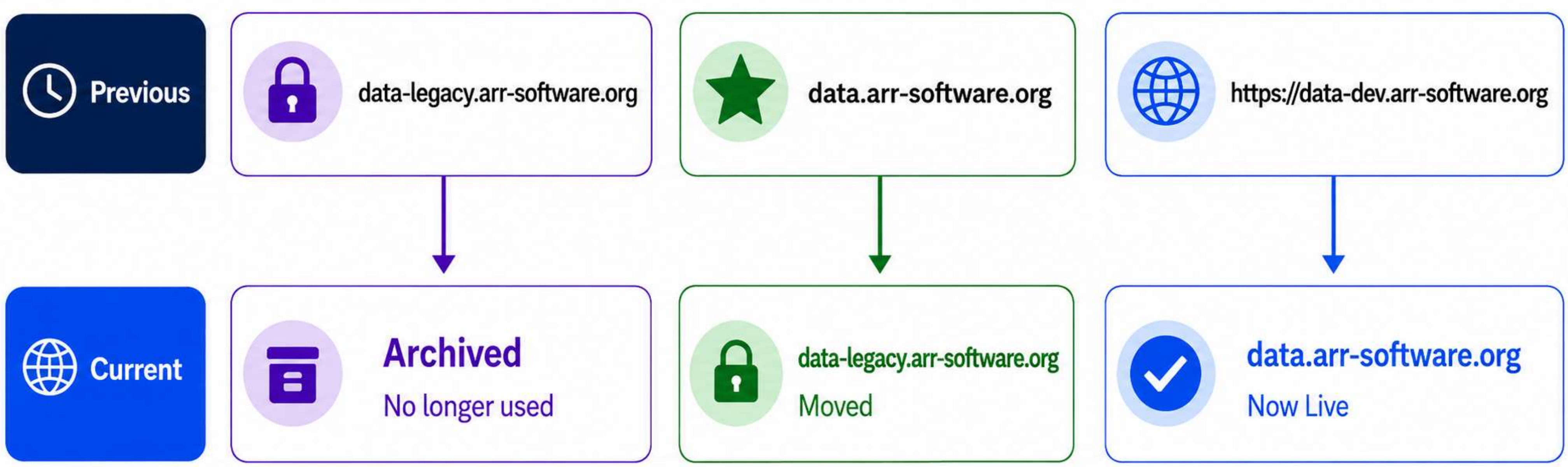
- The datahub is now 10 years old
- The release version was supposed to be a proof of concept, but no agency or EA would take on hosting
- ~99.9% uptime in that 10 years
  - 2 planned outages
  - 1 major DDOS attack
- This is the first major update

# History of Datahub – Why a Datahub?

- ARR 2016 V4.0 - decision was to move away from reading off maps
  - Minimise error and improve repeatability
- Allows updates without having to disseminate changes to all stakeholders individually
- Single source of truth
- Solves the "Secondary and occasional user problem"
  - The occasional users and people outside of the flood industry get the right information
  - Maps do not get embedded in other tools, software and design guides

# Update process

- New version is available on the development site
  https://data-dev.arr-software.org
- After users and software companies have tested this site, the version will be locked and at an agreed date shifted to main datahub.



# Drivers for Update

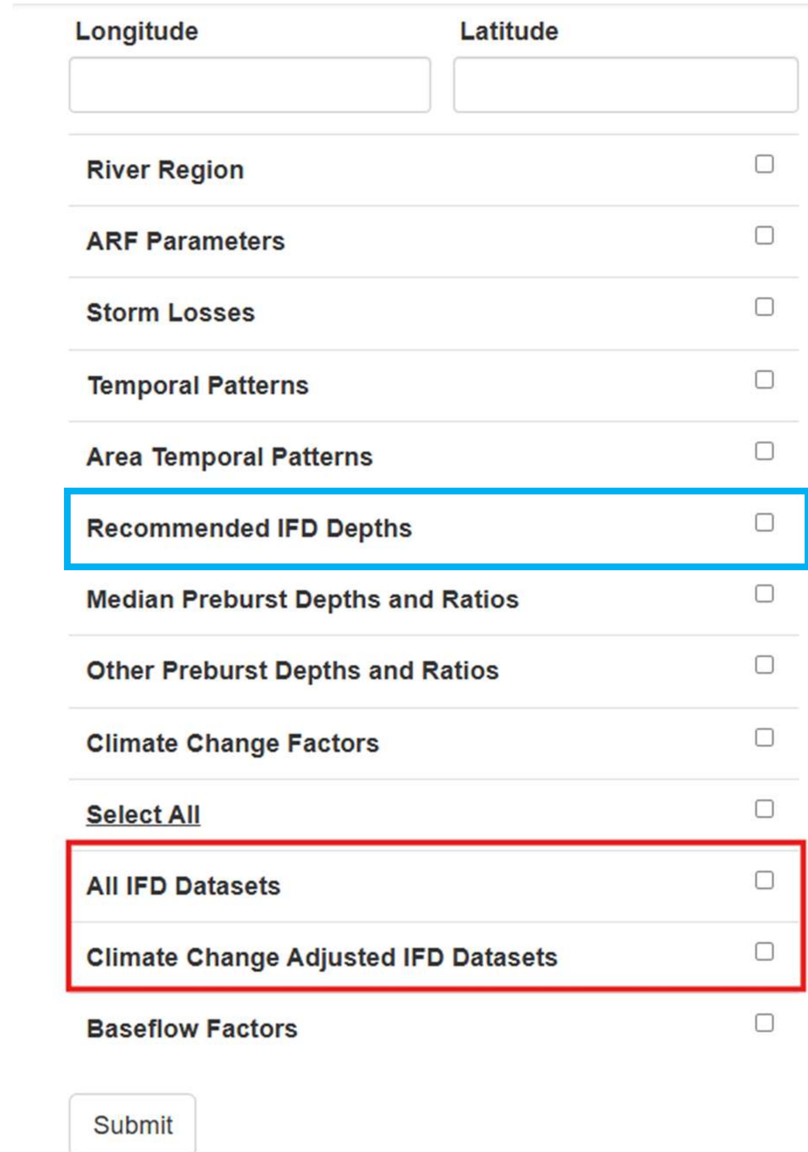
- Getting all the IFDs in one place
- All users should get currently recommended design inputs for their location
- Making 2030 the default IFD case (not much infrastructure being designed for 1960-1990 conditions)
- New NSW pre-burst and loss guidance

# Substantive Changes

- IFD Changes
- Climate Change Adjustments
- NSW Pre-burst and loss changes
- User experience

# IFD Changes

- Everywhere gets Recommended IFD depths
- Additional buttons added for All IFD Datasets and Climate Change Adjusted IFD Datasets
  - These can produce lots of additional outputs
- 2030 is now the default baseline period
- Pre-burst depths also relative to 2030 baseline



# IFD Data sets Grids

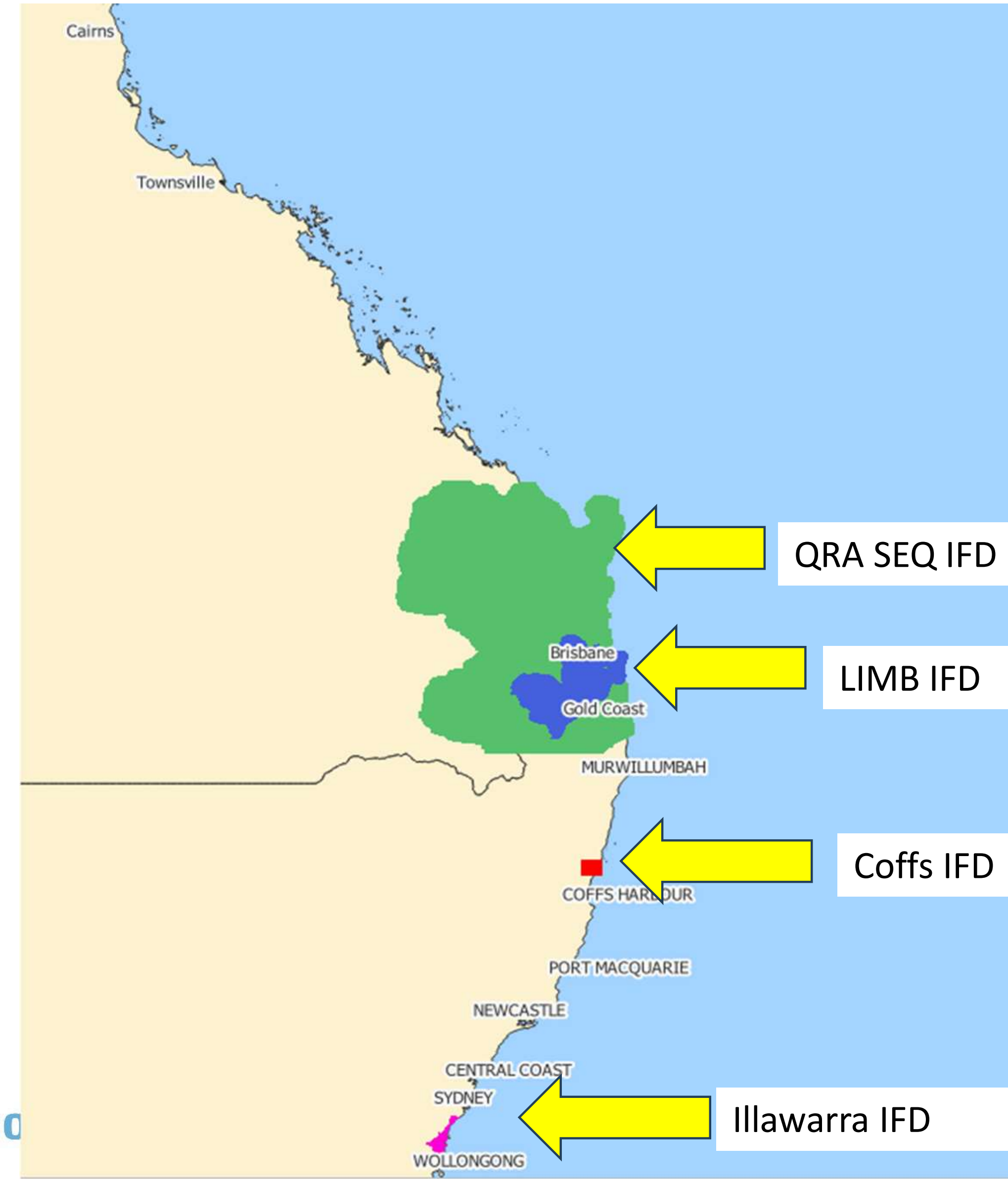
**New to the datahub**

- QRA SEQ IFD (HARC, 2025) - QLD coastal catchments south of Gladstone

**Existing**

- LIMB IFD (WMAwater, 2019) - Lockyer, Ipswich, Moreton bay and Brisbane
- Coffs IFD (WMAwater, 2018/21)* - parts of Coffs LGA
- Illawarra IFD (WMAwater, 2017) – Wollongong, Shellharbour
- BoM IFD (BoM, 2016) – all Australia

* Limited access



# QRA IFD - Process

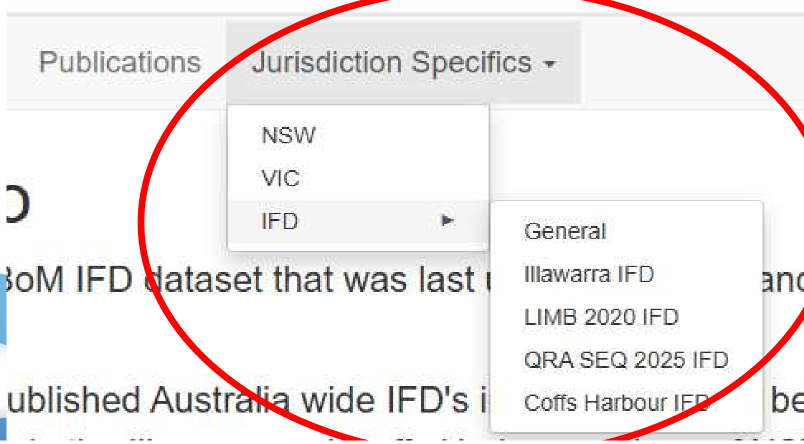
- QRA lead process following 2022 floods
- IFD’s developed by HARC and independently peer reviewed
- QRA requested IFD be placed on the data hub
- Implementation was peer reviewed by Phillip Jordan of HARC
- Produces the same answers as the raw grids
- Datahub values rounded to 3 significant figures to align with BoM

Queensland Government

Queensland Reconstruction Authority

# IFD – Jurisdictional

- Jurisdictions have recommended which IFDs to use
- Can include envelopes
  - Envelopes at the same baseline
- Information included in the layer Info




| Region | Recommended IFD* |
|---|---|
| Bundaberg | Envelope(QRA SEQ 2025 IFD, BoMIFD)* |
| North Burnett | QRA SEQ 2025 IFD* |
| Fraser Coast | QRA SEQ 2025 IFD* |
| South Burnett | QRA SEQ 2025 IFD* |
| Cherbourg | QRA SEQ 2025 IFD* |
| Gympie | QRA SEQ 2025 IFD* |
| Noosa | QRA SEQ 2025 IFD* |
| Sunshine Coast | QRA SEQ 2025 IFD* |
| Somerset | QRA SEQ 2025 IFD* |
| Scenic Rim | QRA SEQ 2025 IFD* |
| Toowoomba | QRA SEQ 2025 IFD* |
| Lockyer Valley | Envelope(LIMB 2020 IFD, QRA SEQ 2025 IFD)* |
| Ipswich | Envelope(LIMB 2020 IFD, QRA SEQ 2025 IFD)* |
| Moreton Bay | LIMB 2020 IFD* |
| Brisbane | LIMB 2020 IFD* |
| Gold Coast | BoM IFD* |
| City of Wollongong LGA | Illawarra IFD* |
| City of Coffs Harbour LGA | Coffs Harbour IFD* |

*Current recommended IFDs are draft and may not represent the regions' final recommenda

DRAFT

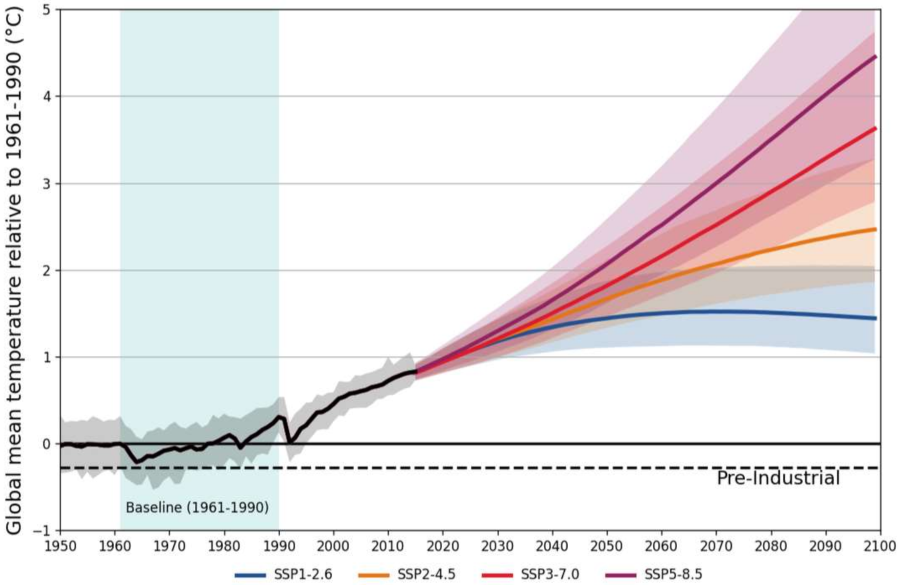
# IFD Sampling

- Point rainfall = use a point query
- Centroid rainfall = use a point query
- Large Catchment/sub catchment = use shape file
- Catchment <= 6.25km^  = you get a point sample anyway
- Catchment must be fully within dataset (+- 0.1%)
- Crazy shapefiles
  - Doesn’t contain an IFD centroid: gets nearest cell
  - Too big:
  - Too many vertices:
  - Different country:

**Rejected**

# Climate Change Adjustments

- IFD grids and pre-burst depths are adjusted to 2030 baseline by default
  - Using ARR V4.2 Climate Change Considerations Chapter
- Native baseline also provided, underneath the 2030 values
  - Different IFD grids have different baselines and some methodological differences
  - Should be compared at a single baseline
- Prevents incorrect adjustments
- Uses the IPCC AR6 data – Consistent with ARR
  - Gives slightly different values than NOAA surface temperature data



# 2030 Baseline Flow on Effects

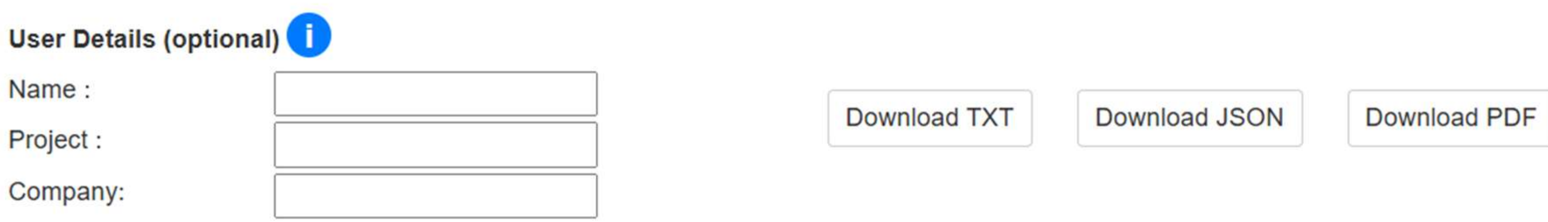
- Pre-burst depths updated to 2030 IFD
  - Ratios are unchanged
- Baseline temperature adjustments provided in layer info so you can make other adjustments in consistent manner

### Layer Info

| | |
|---|---|
| **Time Accessed** | 13 August 2026 06:32AM |
| **Datasets** | Envelope {QRA_SEQ_IFD(2025), LIMBIFDhr(2019)} |
| **Native Baseline** | QRA_SEQ_IFD(2025) scaled from 2010 baseline<br>LIMBIFDhr(2019) scaled from 2002 for duration < 1440 or 1961-1990 for duration >= 1440 |
| **ΔT** | QRA_SEQ_IFD(2025):<br>0.5 (from native baseline)<br>1.2 (from 1961-1990 baseline)<br>LIMBIFDhr(2019):<br>0.7 for duration < 1440 or 1.2 for duration >= 1440 (from native baseline)<br>1.2 (from 1961-1990 baseline) |

# Other Changes

- Nominate outlet to set jurisdiction
- More GIS files types supported
- Enhanced Shapefile sampling
- Faster
- Wider layout
- Optional project details (Job name, number, and user)
- Pdf output actually works



# Datahub demo – QLD

# NSW Pre-burst and Loss Changes

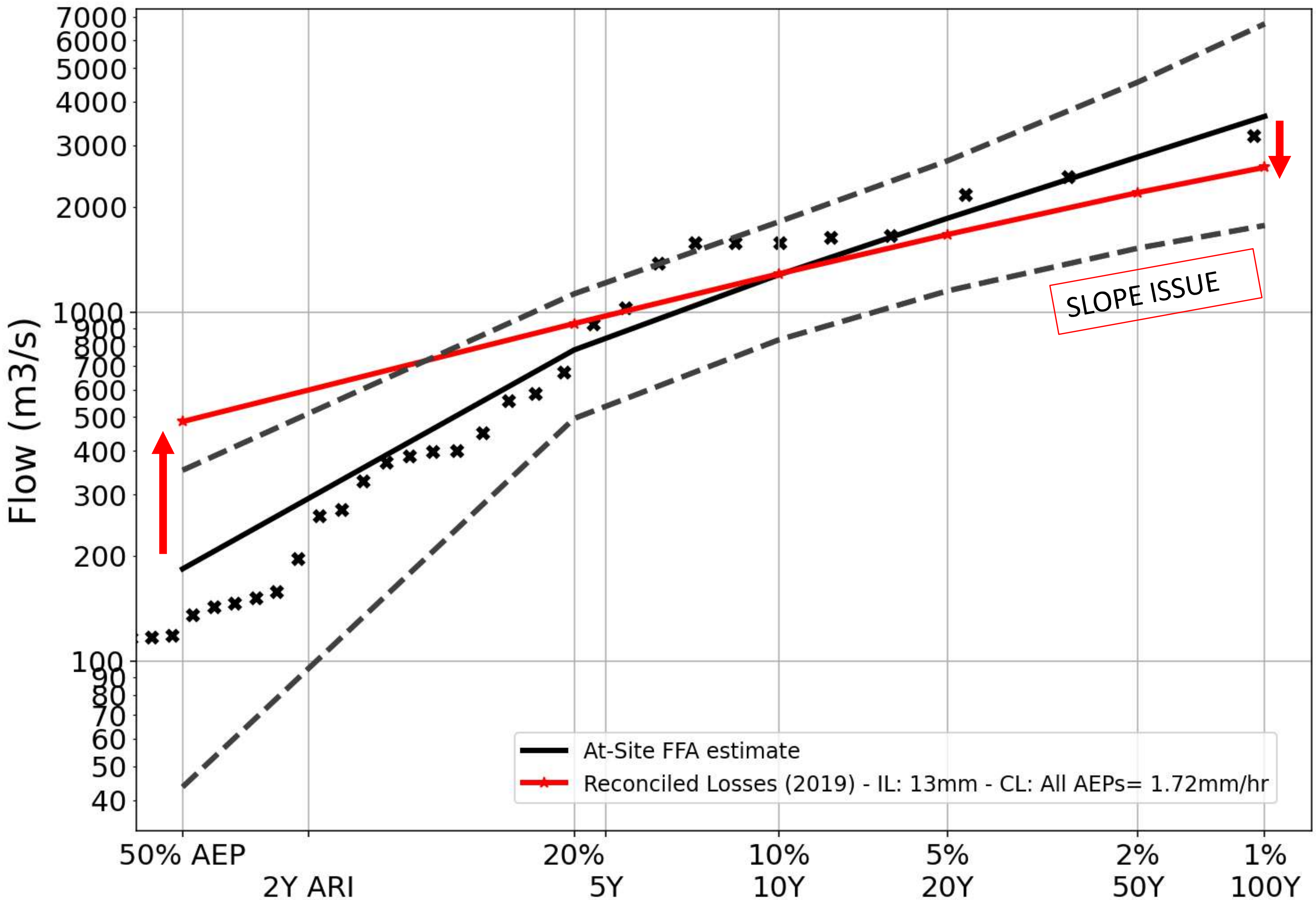
- Updated Pre-burst grids using data to 2025
- Mix of 50% and 75% pre-burst depths
- Pre-burst temporal patterns- automatically selected using pre-burst ratio
- Revised loss hierarchy
- Simplified losses

Recommended Preburst Temporal Patterns | Download (.csv)

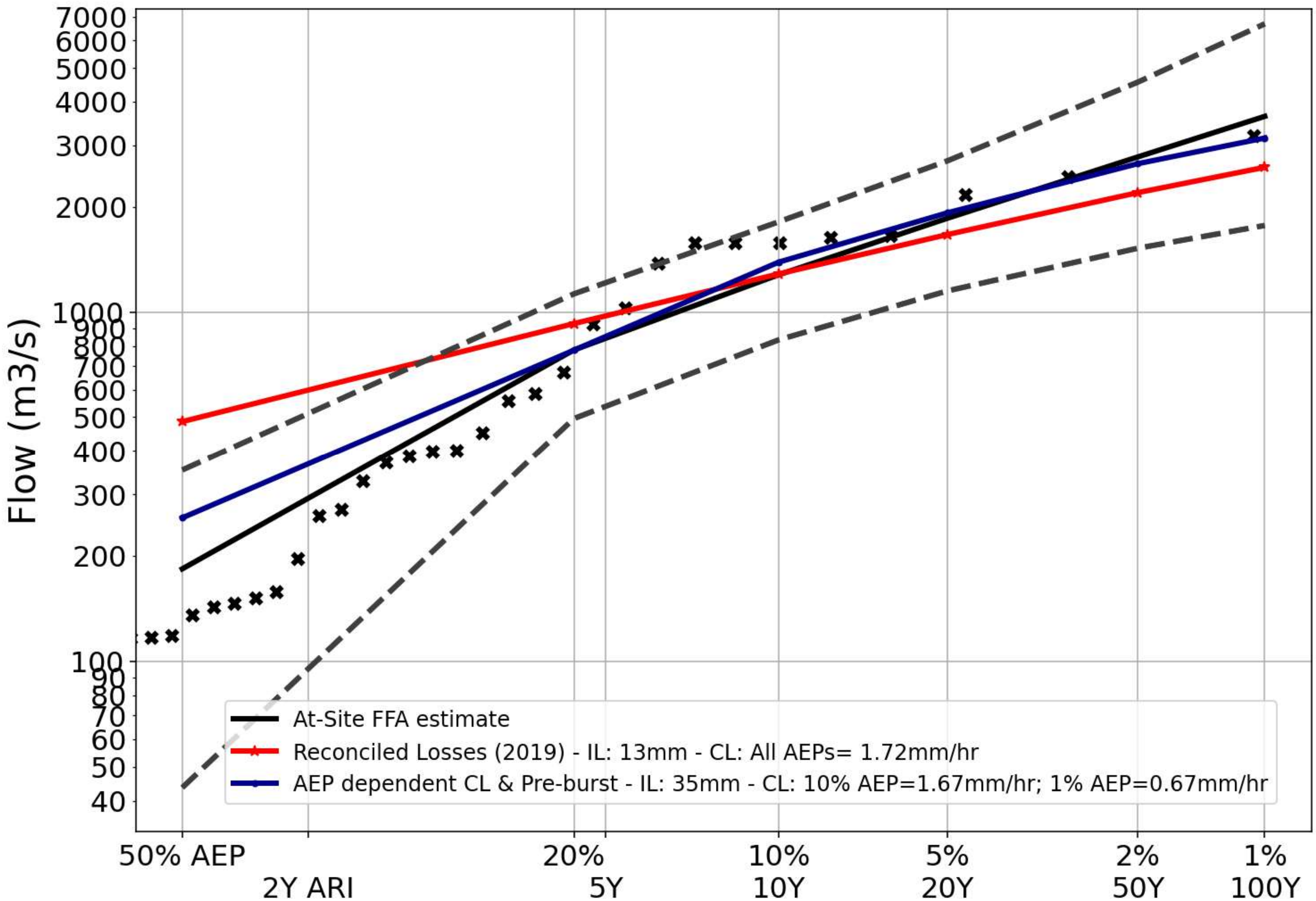
Values are of the format pattern ID (ratio)

| min (h)\AEP(%) | 50.0 | 20.0 | 10.0 | 5.0 | 2.0 | 1.0 |
|---|---|---|---|---|---|---|
| 60 (1.0) | 25594 (0.157) | 26262 (0.091) | 23439 (0.546) | 47129 (0.339) | 31431 (0.283) | 31431 (0.249) |
| 90 (1.5) | 6679 (0.143) | 26262 (0.092) | 25682 (0.704) | 23439 (0.605) | 46739 (0.477) | 47129 (0.402) |
| 120 (2.0) | 25317 (0.272) | 2190 (0.173) | 47118 (0.817) | 27407 (0.753) | 23327 (0.533) | 2246 (0.407) |
| 180 (3.0) | 5554 (0.268) | 47485 (0.155) | 35921 (0.700) | 41935 (0.614) | 41935 (0.606) | 41935 (0.596) |
| 360 (6.0) | 31800 (0.130) | 43505 (0.195) | 49142 (0.741) | 49142 (0.729) | 27815 (0.654) | 27815 (0.606) |
| 720 (12.0) | 1581 (0.063) | 2873 (0.101) | 45017 (0.368) | 45017 (0.361) | 45017 (0.362) | 45017 (0.360) |
| 1080 (18.0) | 28862 (0.046) | 2873 (0.070) | 25327 (0.330) | 25327 (0.343) | 25327 (0.328) | 25327 (0.319) |
| 1440 (24.0) | - (0.004) | 25099 (0.039) | 30230 (0.227) | 30230 (0.248) | 30230 (0.256) | 30230 (0.259) |
| 2160 (36.0) | - (0.000) | 25099 (0.013) | 31962 (0.139) | 31962 (0.154) | 34799 (0.174) | 34799 (0.185) |
| 2880 (48.0) | - (0.000) | - (0.001) | 46052 (0.046) | 46052 (0.048) | 29005 (0.085) | 3830 (0.105) |
| 4320 (72.0) | - (0.000) | - (0.000) | - (0.006) | - (0.006) | 40144 (0.057) | 40144 (0.085) |

Show Plot



Flow (m3/s)
7000
6000
5000
4000
3000
2000
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
SLOPE ISSUE
At-Site FFA estimate
Reconciled Losses (2019) - IL: 13mm - CL: All AEPs= 1.72mm/hr
50% AEP
2Y ARI
20%
5Y
10%
10Y
5%
20Y
2%
50Y
1%
100Y



Flow (m3/s)
7000
6000
5000
4000
3000
2000
1000
900
800
700
600
500
400
300
200
100
90
80
70
60
50
40
At-Site FFA estimate
Reconciled Losses (2019) - IL: 13mm - CL: All AEPs= 1.72mm/hr
AEP dependent CL & Pre-burst - IL: 35mm - CL: 10% AEP=1.67mm/hr; 1% AEP=0.67mm/hr
50% AEP
2Y ARI
20%
5Y
10%
10Y
5%
20Y
2%
50Y
1%
100Y

# How does it work? – Pre-burst

- Updated Pre-burst values direct from ARR datahub based on twice as many storms (up to 2025)
- ARR Datahub provides automatically selected pre-burst temporal patterns

Recommended Preburst Depths and Ratios

Values are of the format depth (ratio) with depth in mm

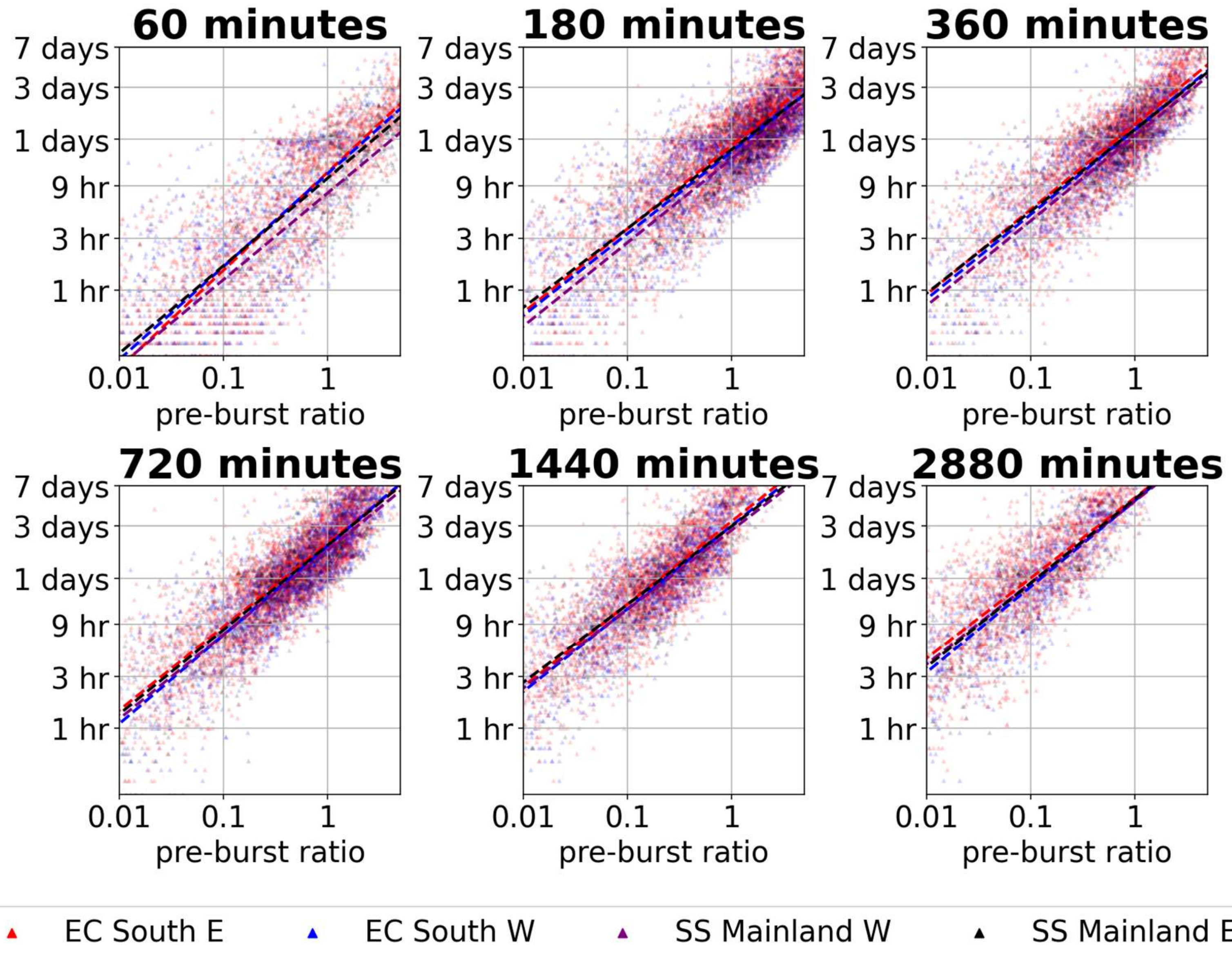
| min (h)\AEP(%) | 50.0 | 20.0 | 10.0 | 5.0 | 2.0 | 1.0 |
|---|---|---|---|---|---|---|
| 60 (1.0) | 14.2 (0.371) | 9.9 (0.192) | 45.1 (0.746) | 41.3 (0.596) | 33.5 (0.411) | 27.6 (0.303) |
| 90 (1.5) | 15.6 (0.359) | 11.4 (0.196) | 43.2 (0.631) | 38.5 (0.489) | 33.7 (0.363) | 30.1 (0.290) |
| 120 (2.0) | 10.7 (0.224) | 9.7 (0.152) | 47.4 (0.631) | 47.0 (0.544) | 46.7 (0.458) | 46.5 (0.407) |
| 180 (3.0) | 9.0 (0.166) | 8.1 (0.111) | 53.2 (0.617) | 50.9 (0.512) | 65.6 (0.556) | 76.4 (0.575) |
| 360 (6.0) | 13.1 (0.188) | 23.8 (0.253) | 80.7 (0.721) | 93.6 (0.717) | 104.3 (0.671) | 112.3 (0.639) |
| 720 (12.0) | 3.8 (0.042) | 11.0 (0.087) | 52.2 (0.345) | 62.8 (0.356) | 79.6 (0.375) | 91.7 (0.382) |
| 1080 (18.0) | 4.3 (0.039) | 10.1 (0.068) | 54.8 (0.303) | 66.0 (0.310) | 81.0 (0.316) | 92.2 (0.318) |
| 1440 (24.0) | 1.1 (0.009) | 5.9 (0.035) | 43.3 (0.211) | 54.6 (0.226) | 67.6 (0.232) | 77.3 (0.234) |
| 2160 (36.0) | 0.0 (0.000) | 2.9 (0.014) | 32.7 (0.134) | 41.8 (0.145) | 56.7 (0.164) | 67.9 (0.173) |
| 2880 (48.0) | 0.0 (0.000) | 0.0 (0.000) | 11.7 (0.043) | 15.1 (0.047) | 24.9 (0.065) | 32.2 (0.074) |
| 4320 (72.0) | 0.0 (0.000) | 0.0 (0.000) | 1.7 (0.006) | 2.4 (0.007) | 22.2 (0.051) | 37.1 (0.076) |

50th percentile

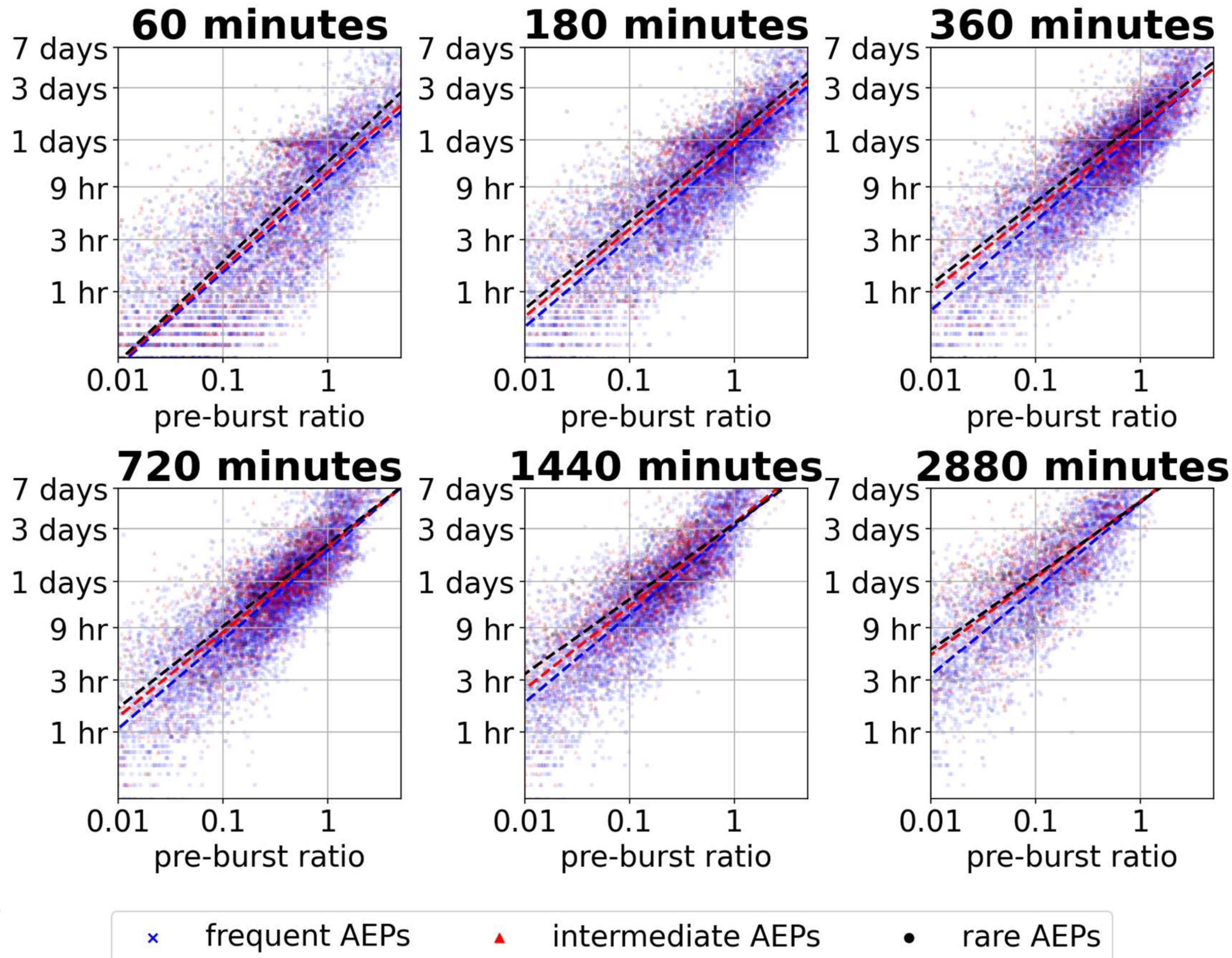
75th percentile

# LOCATION INDEPENDENT

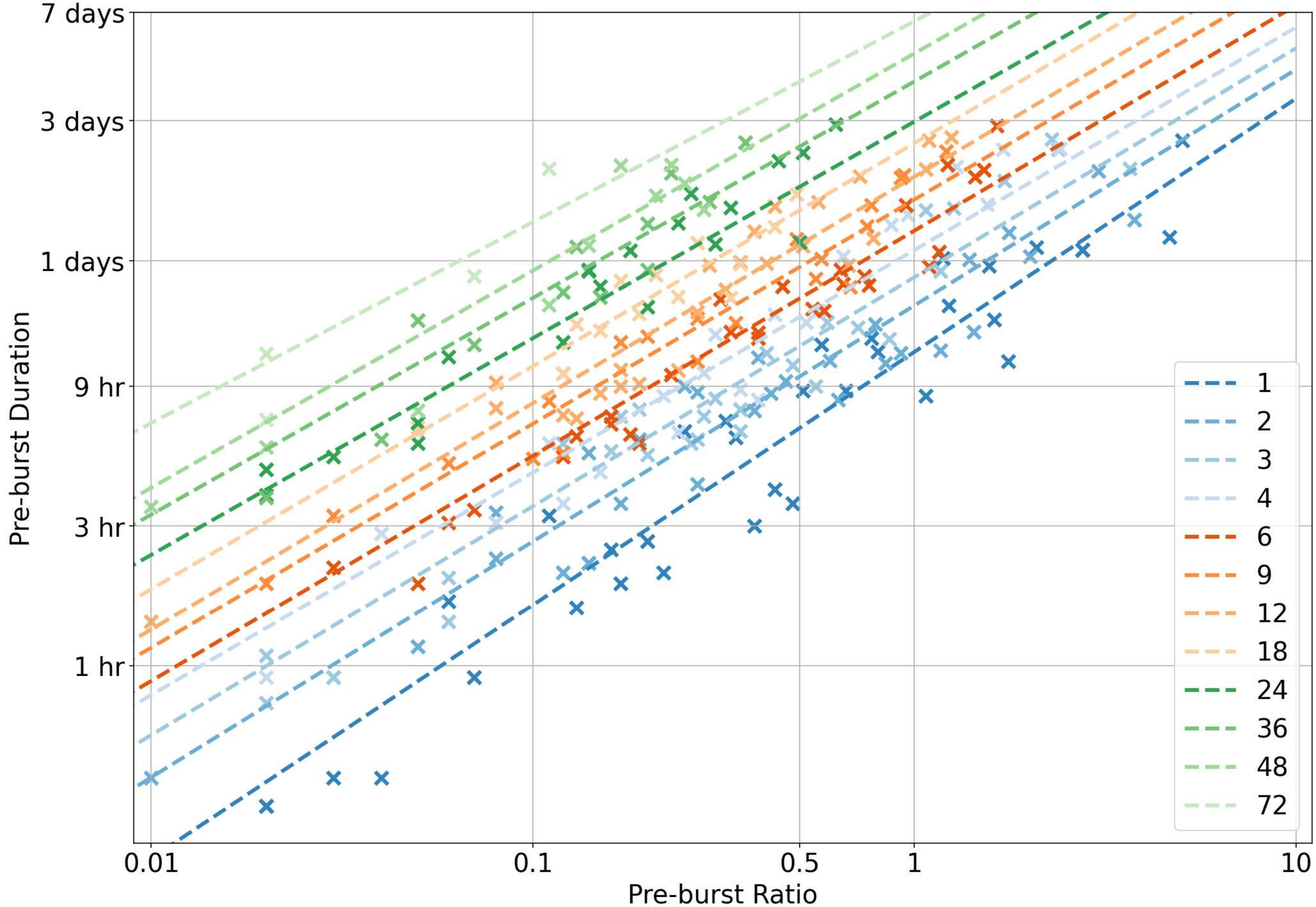
Strong relationship between pre-burst ratio and pre-burst duration



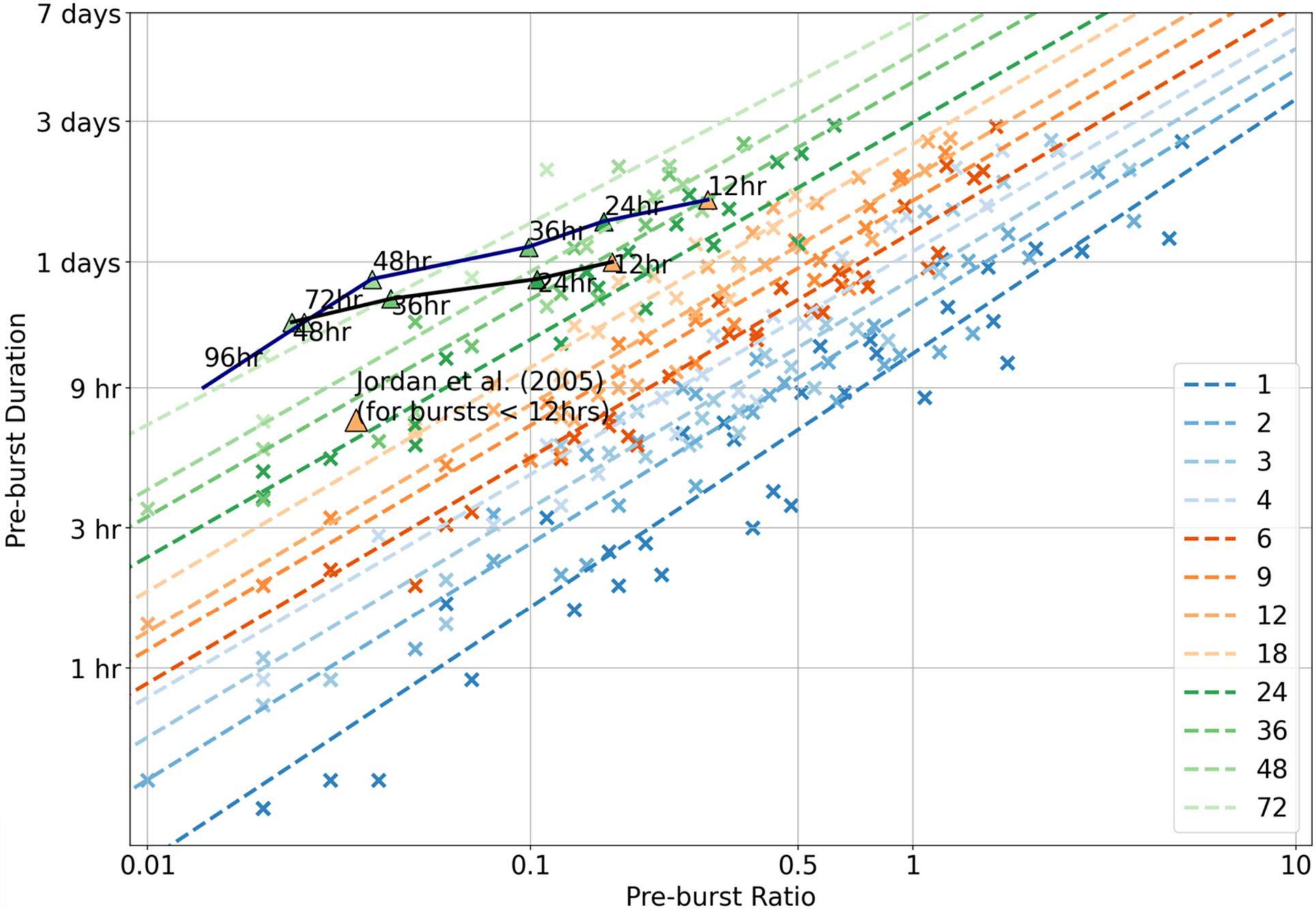
**AEP INDEPENDENT**

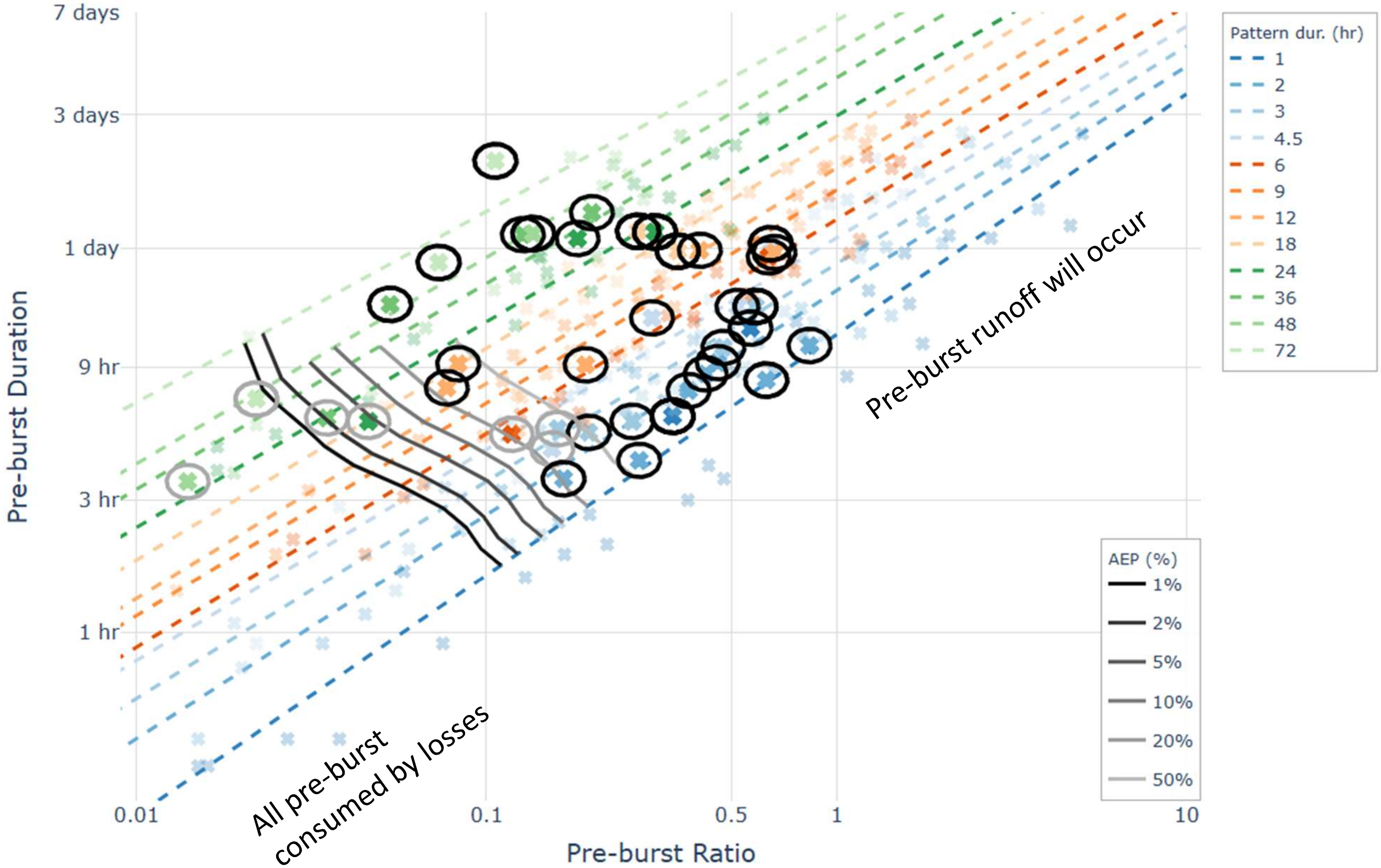


# BURST DURATION DEPENDENT



**BURST DURATION DEPENDENT**




7 days
3 days
1 day
9 hr
3 hr
1 hr
Pre-burst Duration
0.01
0.1
0.5
1
10
Pre-burst Ratio
Pattern dur. (hr)
1
2
3
4.5
6
9
12
18
24
36
48
72
AEP (%)
1%
2%
5%
10%
20%
50%
Pre-burst runoff will occur
All pre-burst
consumed by losses

# How does it work? – Pre-burst patterns

- Pre-burst patterns nominated by datahub
- Identifies where you need them
- Patterns chosen to minimise embedded bursts

Recommended Preburst Temporal Patterns | Download (.csv)

Values are of the format pattern ID (ratio)

| min (h)\AEP(%) | 50.0 | 20.0 | 10.0 | 5.0 | 2.0 | 1.0 |
|---|---|---|---|---|---|---|
| 60 (1.0) | 47129 (0.371) | 45621 (0.192) | 32447 (0.746) | 23439 (0.596) | 47129 (0.411) | 4910 (0.303) |
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| 120 (2.0) | 23718 (0.224) | 2190 (0.152) | 44903 (0.631) | 23327 (0.544) | 31936 (0.458) | 2246 (0.407) |
| 180 (3.0) | 47485 (0.166) | 48256 (0.111) | 41935 (0.617) | 2866 (0.512) | 41935 (0.556) | 41935 (0.575) |
| 360 (6.0) | 43505 (0.188) | 45439 (0.253) | 49142 (0.721) | 49142 (0.717) | 32235 (0.671) | 27815 (0.639) |
| 720 (12.0) | 25616 (0.042) | 44994 (0.087) | 45017 (0.345) | 45017 (0.356) | 45017 (0.375) | 31010 (0.382) |
| 1080 (18.0) | 47819 (0.039) | 2873 (0.068) | 25327 (0.303) | 25327 (0.310) | 25327 (0.316) | 25327 (0.318) |
| 1440 (24.0) | 28336 (0.009) | 25099 (0.035) | 31487 (0.211) | 30230 (0.226) | 30230 (0.232) | 30230 (0.234) |
| 2160 (36.0) | - (0.000) | 25099 (0.014) | 3830 (0.134) | 31962 (0.145) | 31962 (0.164) | 34799 (0.173) |
| 2880 (48.0) | - (0.000) | - (0.000) | 46052 (0.043) | 46052 (0.047) | 29005 (0.065) | 29005 (0.074) |
| 4320 (72.0) | - (0.000) | - (0.000) | - (0.006) | - (0.007) | 40144 (0.051) | 40144 (0.076) |

Pattern ID

# AEP dependent loss and pre-burst

- Default ARR Project 6 losses are no longer recommended in NSW
- Probability neutral losses not recommended and 0.4 CL
- Recommending AEP dependent pre-burst % and variable continuing losses

## Storm Losses

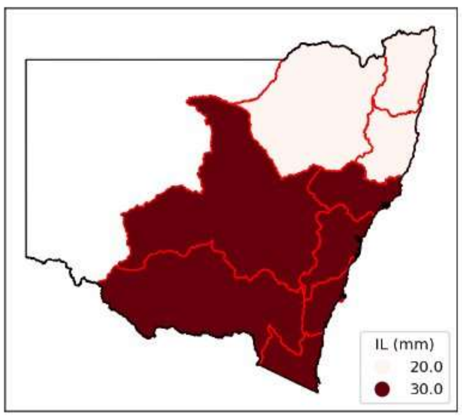
Use preburst temporal pattern where necessary, else use: Burst Loss = Storm Loss - Preburst

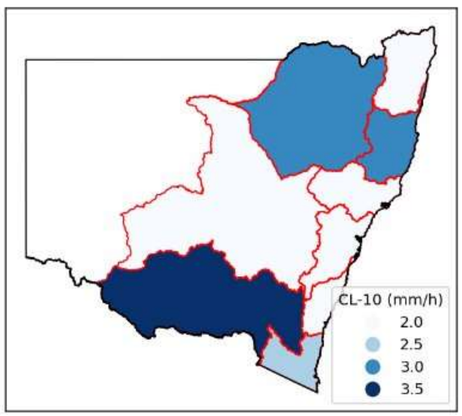
Region: Hawkesbury/Georges River

| AEP | Preburst | Storm Initial Loss (mm) | Continuing Loss (mm/h) |
|---|---|---|---|
| 1% | 75% | 30 | 1.0 |
| 2% | 75% | 30 | 1.25 |
| 5% | 75% | 30 | 1.65 |
| 10% | 75% | 30 | 2.0 |
| 20% | 50% | 30 | 2.2 |
| 50% | 50% | 30 | 2.75 |

# How does it work? – Losses

- Use local data where possible
- Default losses when local data is not available
- IL 20-30mm
- CL-10 2-3.5mm/hr




| Region | Initial Loss (IL) | CL (10% AEP) |
|---|---|---|
| Northern Rivers | 20 | 2 |
| Mid-North Coast | 20 | 3 |
| Hunter | 30 | 2 |
| Hawkesbury/Georges | 30 | 2 |
| Illawarra/Shoalhaven | 30 | 2 |
| Southern NSW | 30 | 2.5 |
| Northern Inland | 20 | 3 |
| Macquarie/Lachlan | 30 | 2 |
| Murrumbidgee/Murray | 30 | 3.5 |

# How does it work? – Losses

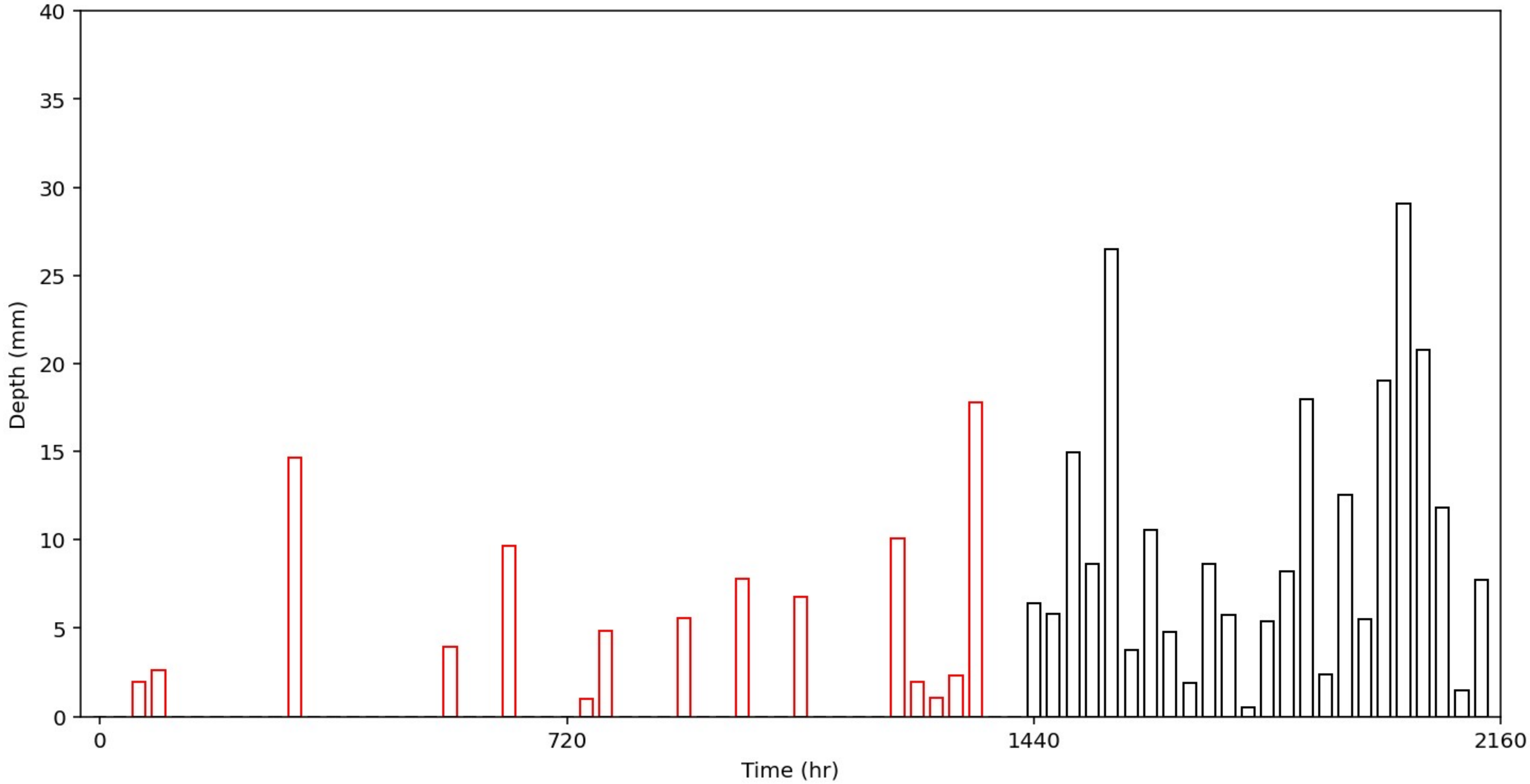
| AEP | Pre-burst Quantile | Recommended CL differences relative to $CL_{10\%AEP}$ |
|---|---|---|
| **1% and rarer** | $75^{th}$ | $CL_{10\%AEP} - 1$ |
| **2%** | $75^{th}$ | $CL_{10\%AEP} - 0.75$ |
| **5%** | $75^{th}$ | $CL_{10\%AEP} - 0.35$ |
| **10%** | $75^{th}$ | $CL_{10\%AEP}$ |
| **20%** | $50^{th}$ | $CL_{10\%AEP} + 0.2$ |
| **50%** | $50^{th}$ | $CL_{10\%AEP} + 0.75$ |

# Validation

- 188 sites assessed in total
- Analysis focussed on a subset of 113 higher quality FFA.
- Gradient match improved on average across the dataset
- It is impossible to match the slope without varying CL
- Real infiltration rate does decease with time
- Does align with observation that not just big floods but big rainfall often occur as part of a wet year and ECL years often have several between Feb-August
- Runoff from the pre-burst is mainly an issue in high rainfall (coastal areas)

# General Method

Scale and Join for an effective "complete storm"



# Datahub demo – NSW

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# Welcome to HWRS 2026.

On behalf of the Organising Committee and the National Committee on Water Engineering, I am delighted to invite you to Adelaide for the 44th Hydrology and Water Resources Symposium.

## This year's Symposium Theme is: "HWRS2026 – From source to sea".

HWRS2026 will attract a diverse range of high-quality papers that will be presented as podium and poster presentations. Over the three days of the symposium, delegates will report on topics covering the spectrum of engineering hydrology (science to application) and the progress made in understanding the uncertainties facing water resources managers now and in the coming decades. This will provide insight on dealing with these challenges from all perspectives.

The symposium will also include the hydrologic games where States and Territories will compete for the coveted Cumec trophy.

Paper topics cover a broad and diverse range of issues including:

- Hydrology
- Flood forecasting
- Integrated water resources planning and management
- Floods – Risk assessment, planning and management
- Urban water management
- Ecosystem responses

Engineers Australia | National Committee on Water Engineering

**Date:** 30 November – 3 December 2026

**Location:** Adelaide, Australia

**Venue:** The InterContinental Adelaide


# Questions