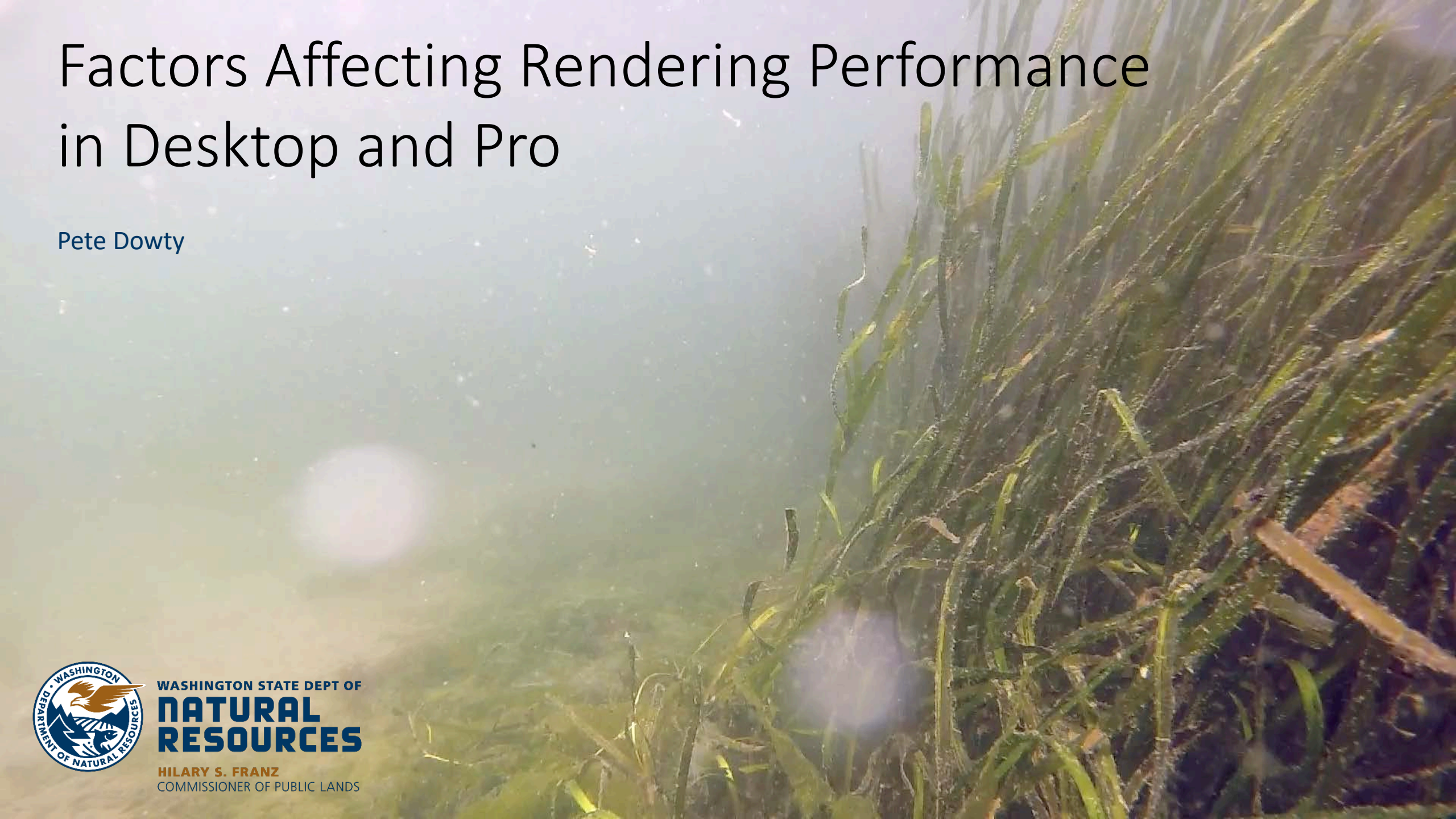
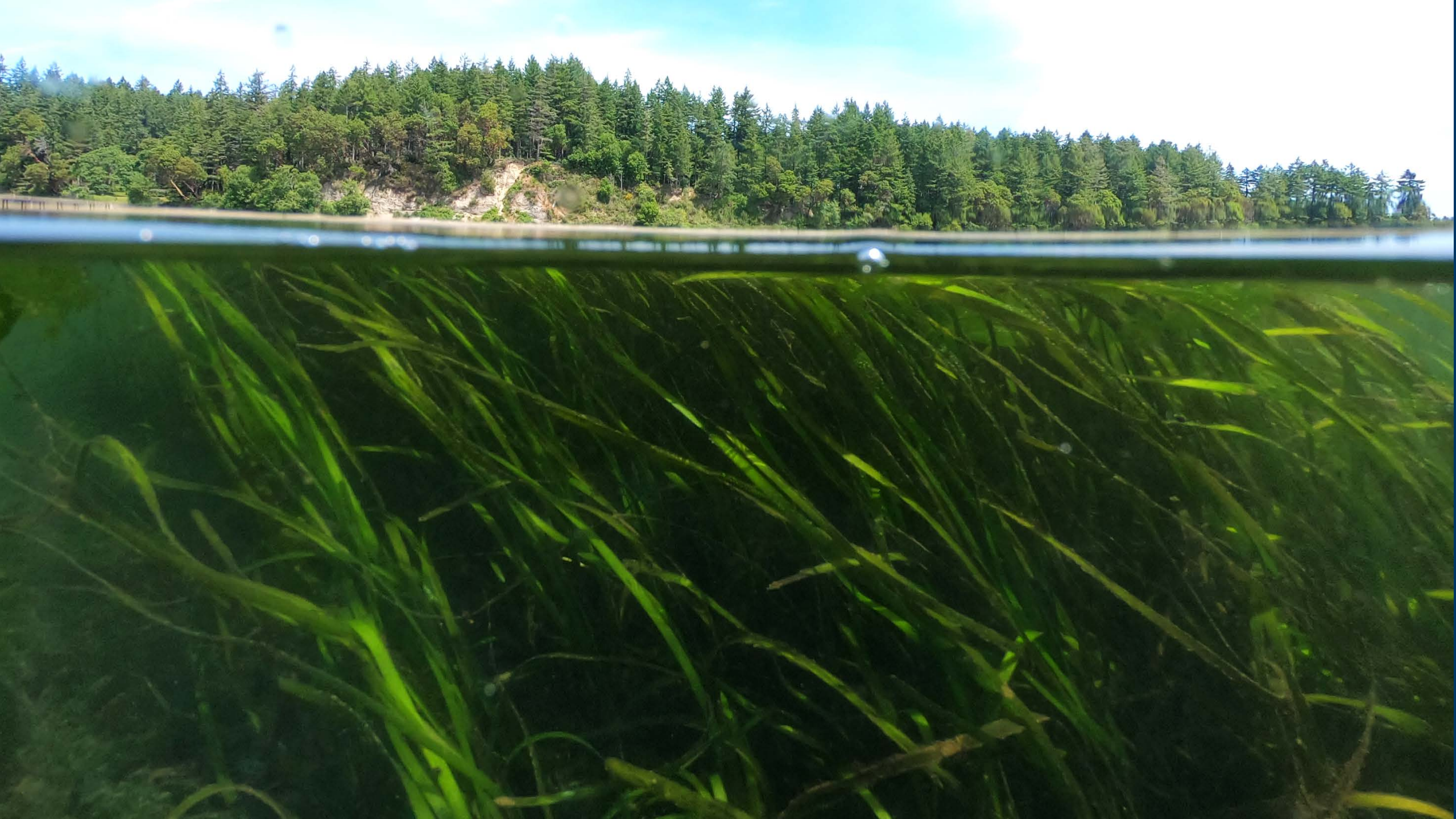
Factors Affecting Rendering Performance in Desktop and Pro

Pete Dowty



WASHINGTON STATE DEPT OF
NATURAL RESOURCES
HILARY S. FRANZ
COMMISSIONER OF PUBLIC LANDS

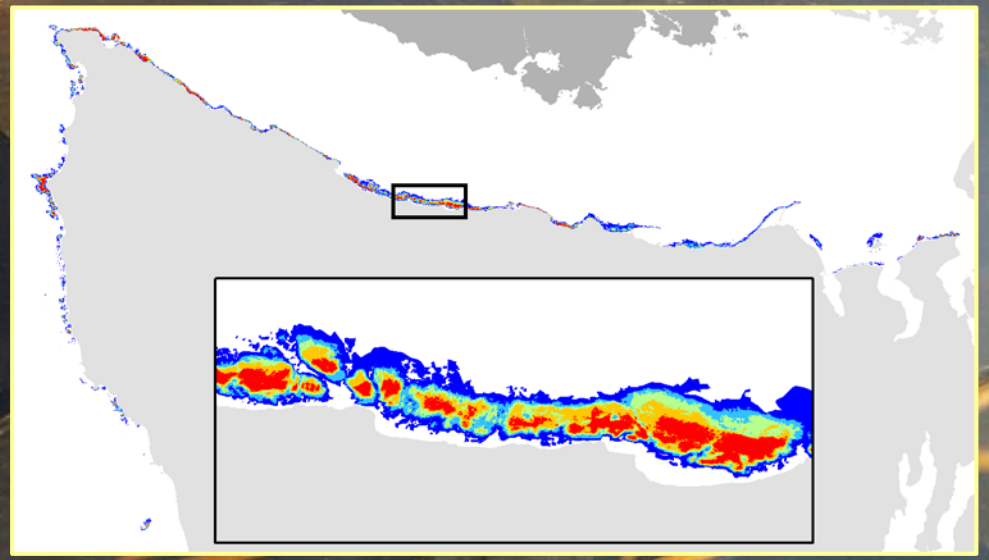


Puget Sound Seagrass Monitoring

- 2000 – 2017 (18 years)
- Boat-deployed underwater video transects
- Veg classified at points at ~1 meter intervals.
- Transect point layer:
  33,000 transects with
  ~11 million points

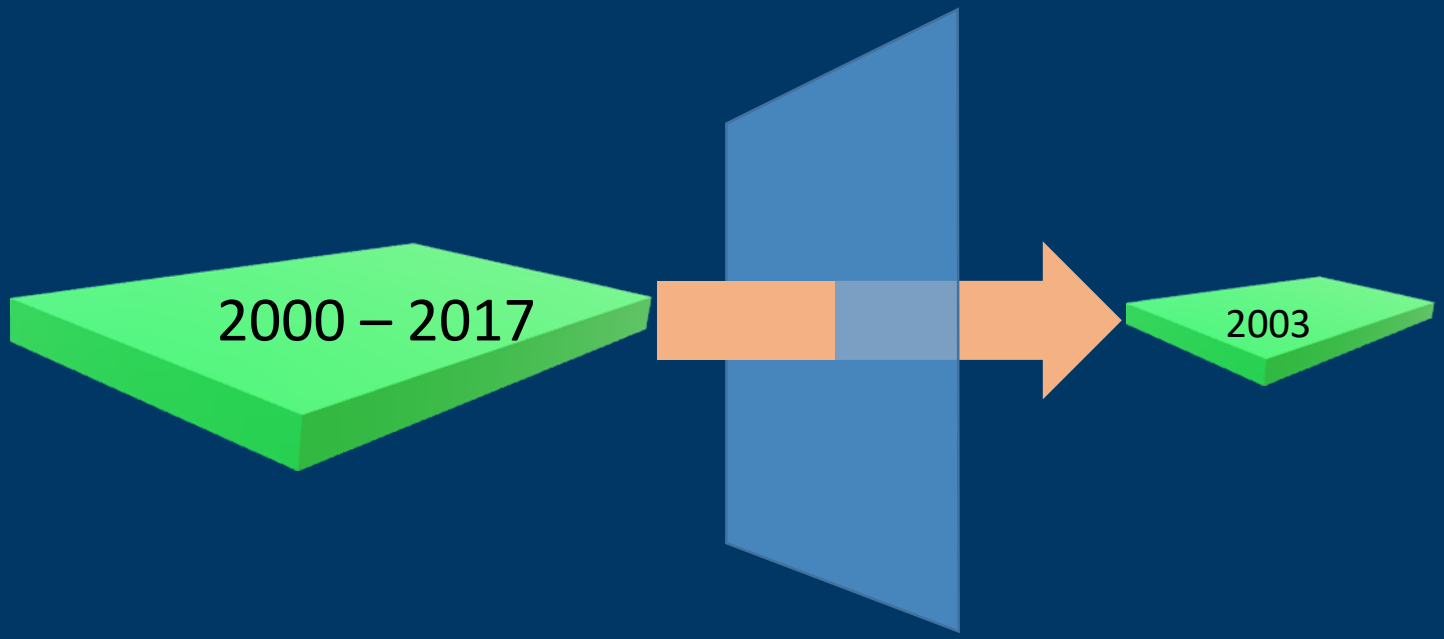
Kelp Monitoring

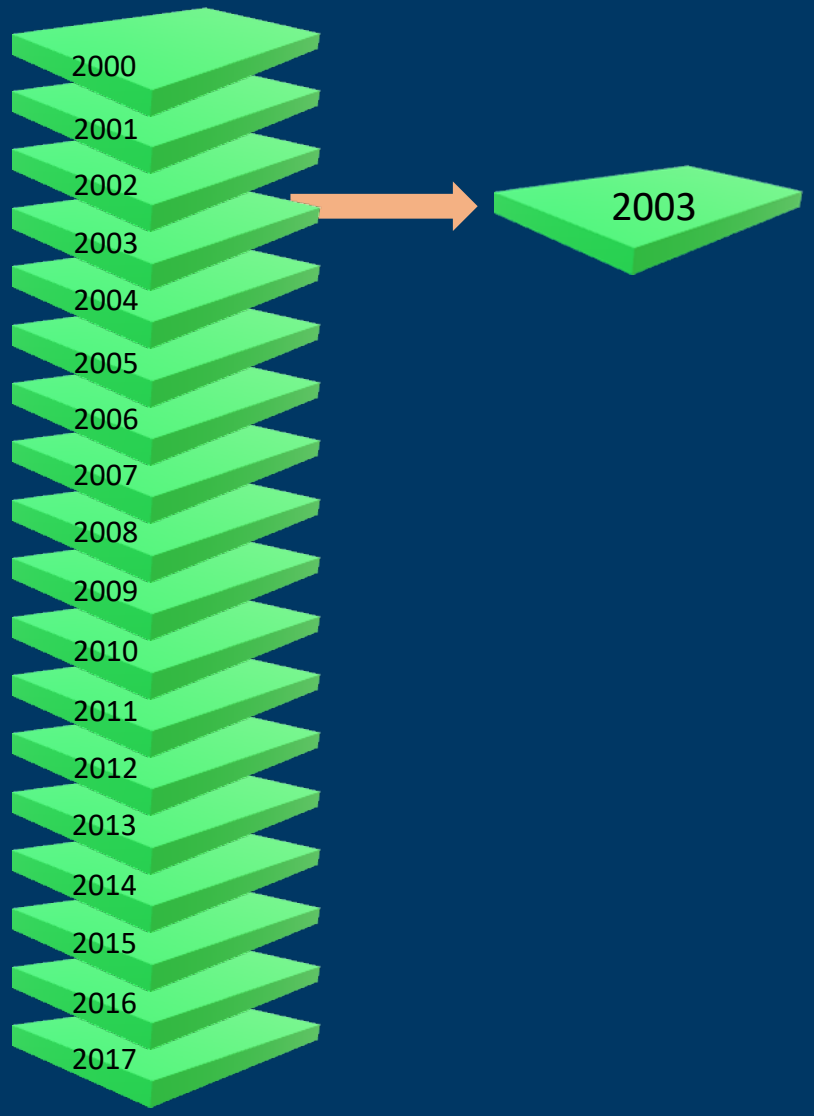
Olympic Peninsula



- 1989 – 2016 (28 years)
- Color IR aerial photos
- Supervised classification
- Years-with-kelp-present:
  ~1.2 million polygons

Definition Queries

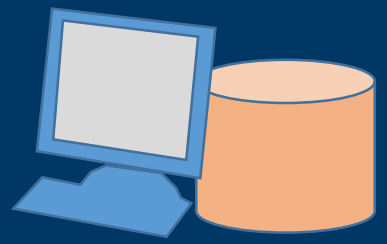




- query field type (date, string, integer)
- query field index

Data Source

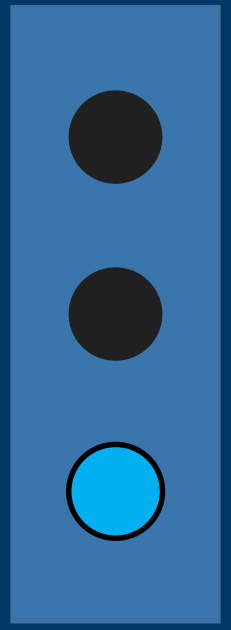
local FGDB



network FGDB

SDE

Symbology



Simple Marker Symbol

Character Marker Symbol

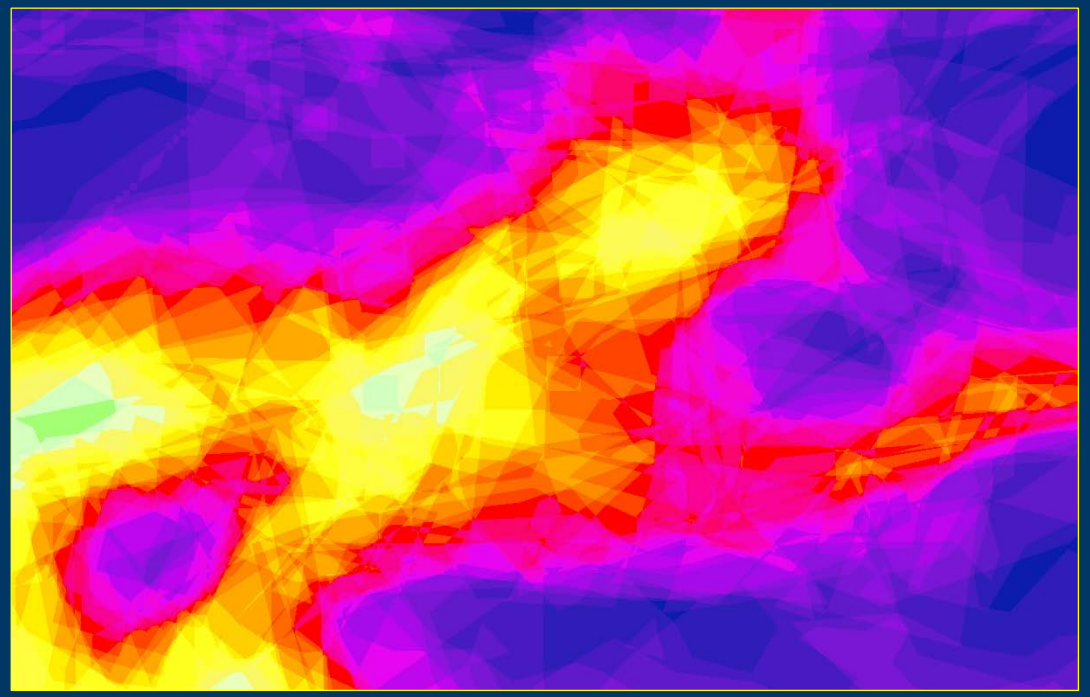
Multi-Layer Character Marker Symbol

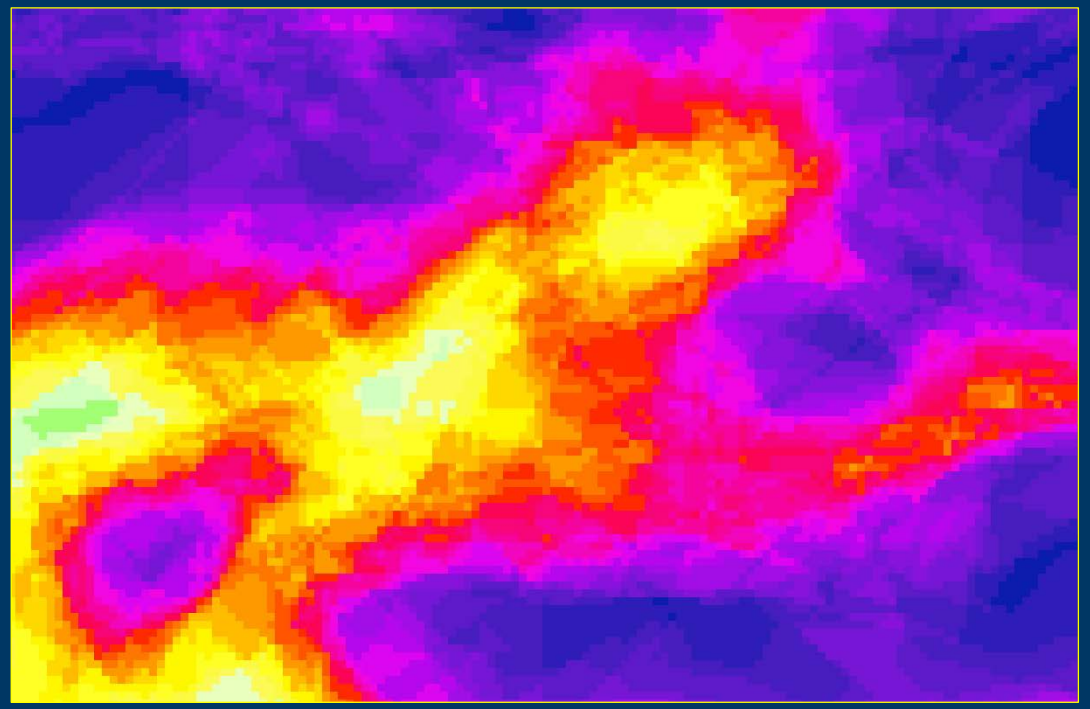
- Symbology field type (integer, string)
- Symbology field index

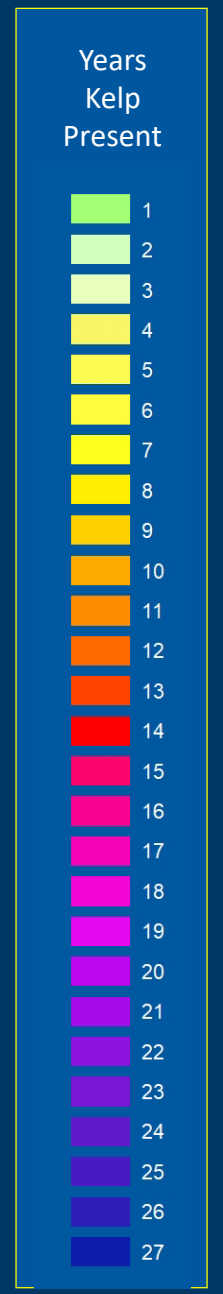
Vector

vs.

Raster







Definition Queries

Data Source

Symbology

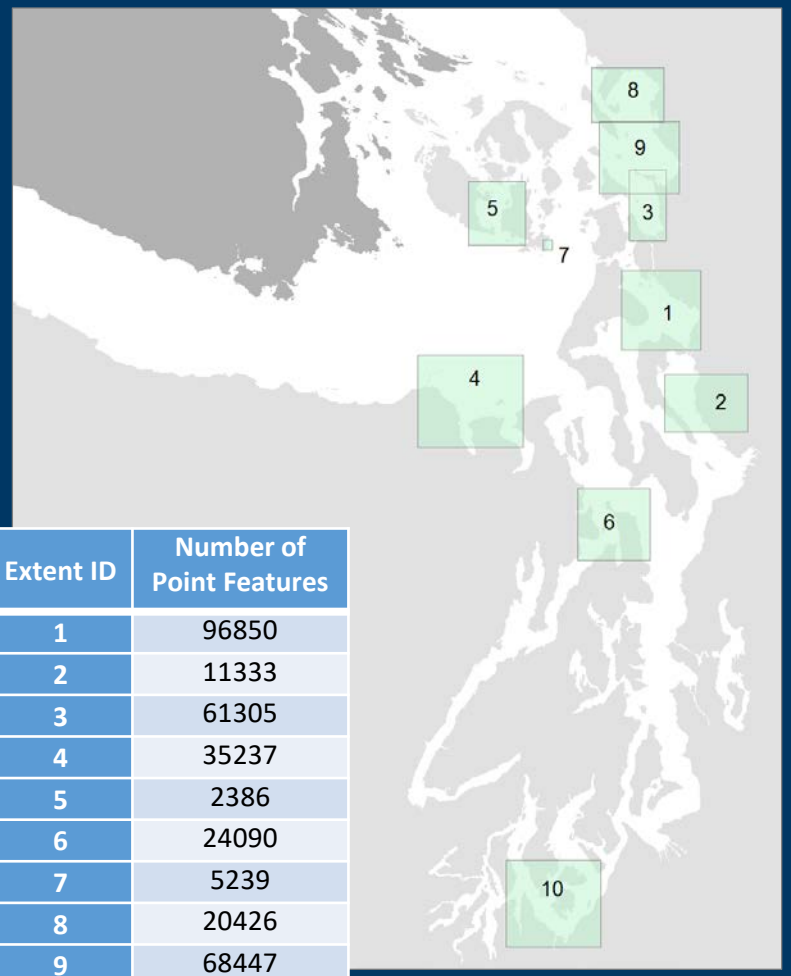
Vector *vs* Raster

Desktop

vs.

Pro

Methods Summary



Extent ID	Number of Point Features
1	96850
2	11333
3	61305
4	35237
5	2386
6	24090
7	5239
8	20426
9	68447
10	36699

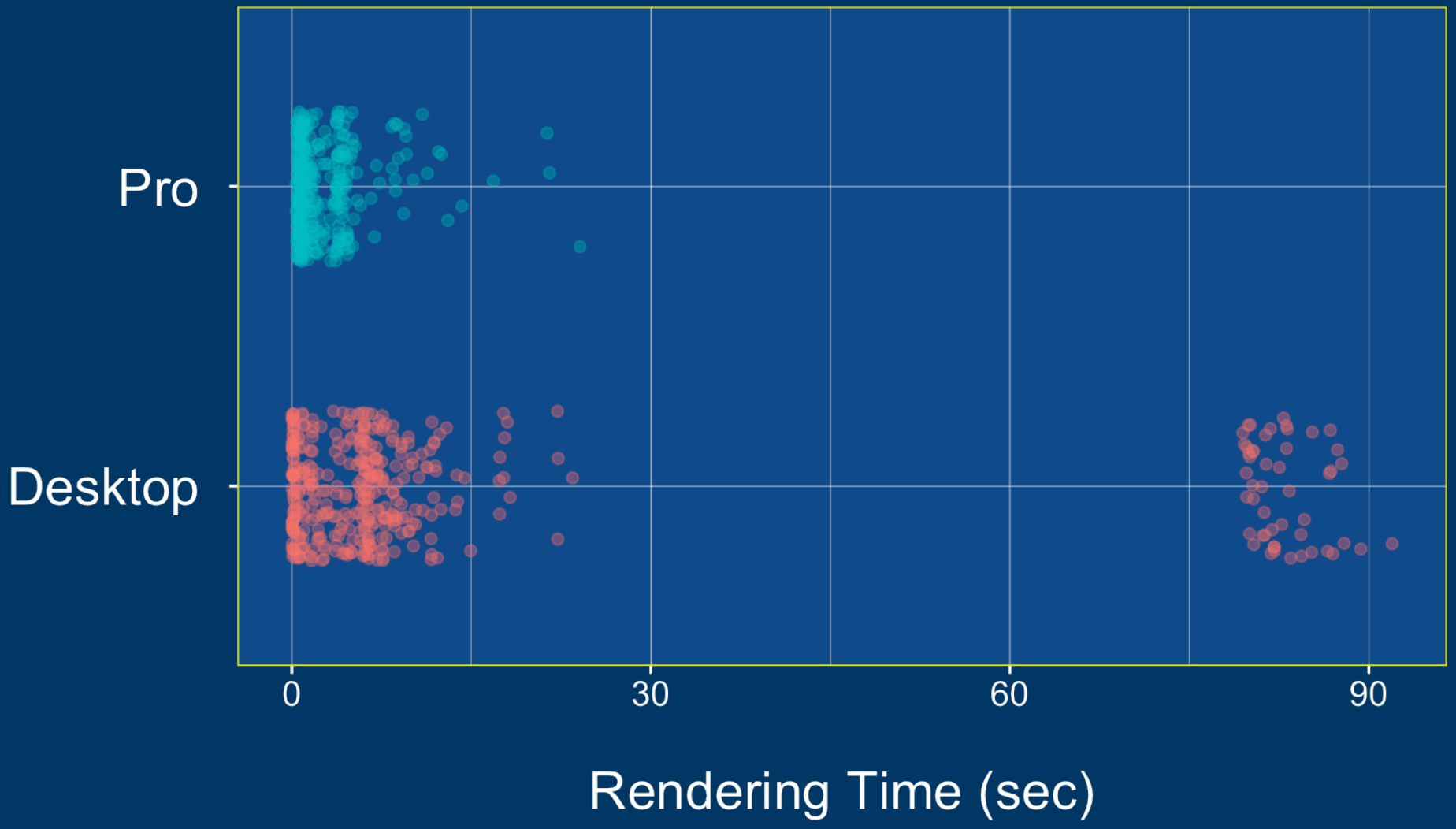
- 41 scenarios were run in Desktop and Pro
- Each scenario was run for 10 different spatial extents
- 820 total renderings were timed

Rendering times recorded with Esri Add-Ins:

- PerfQAnalyzer for ArcGIS Desktop 10.6.1
- PerfTools for ArcGIS Pro 2.2.1

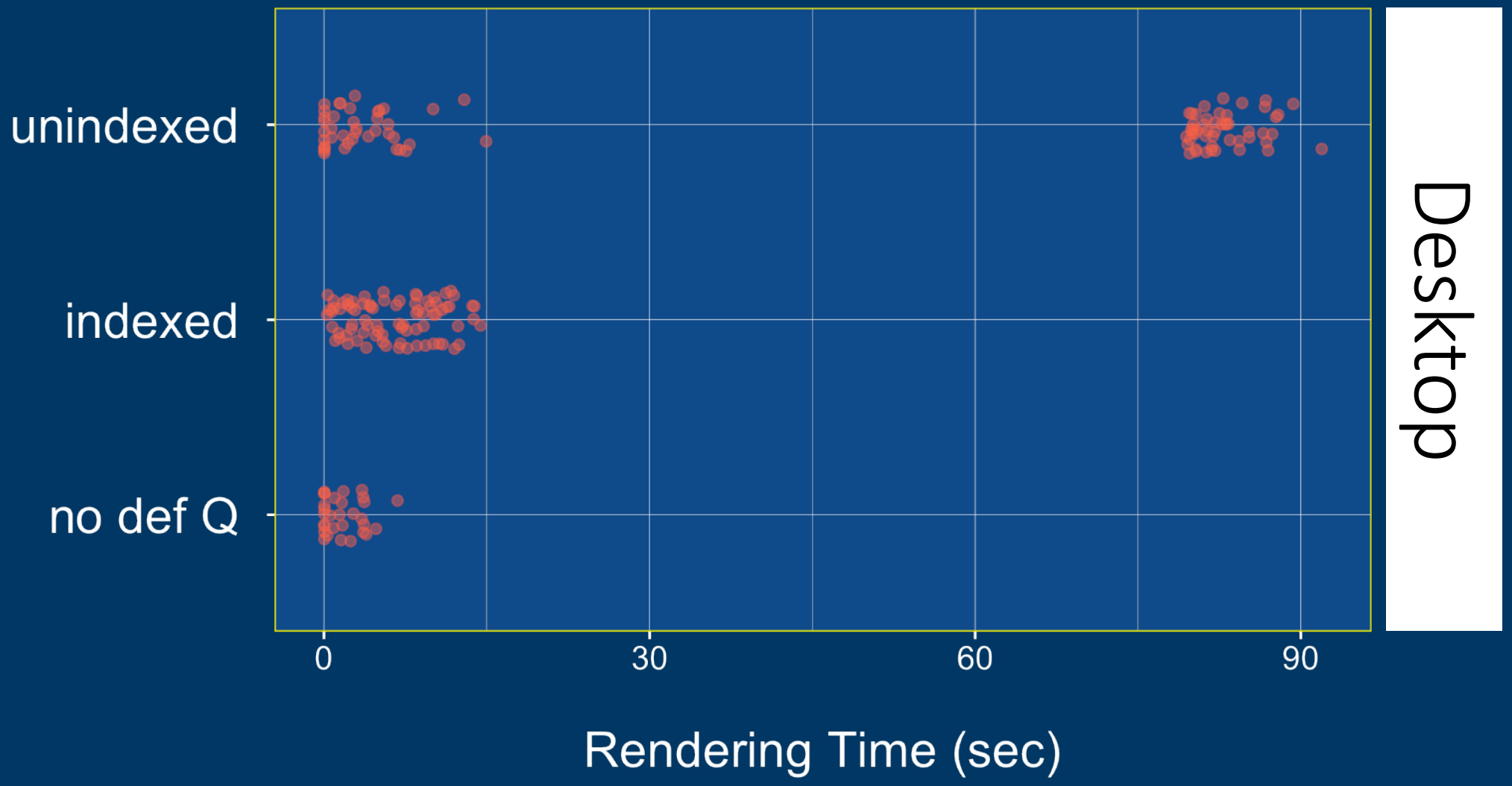
Results

Desktop *vs* Pro

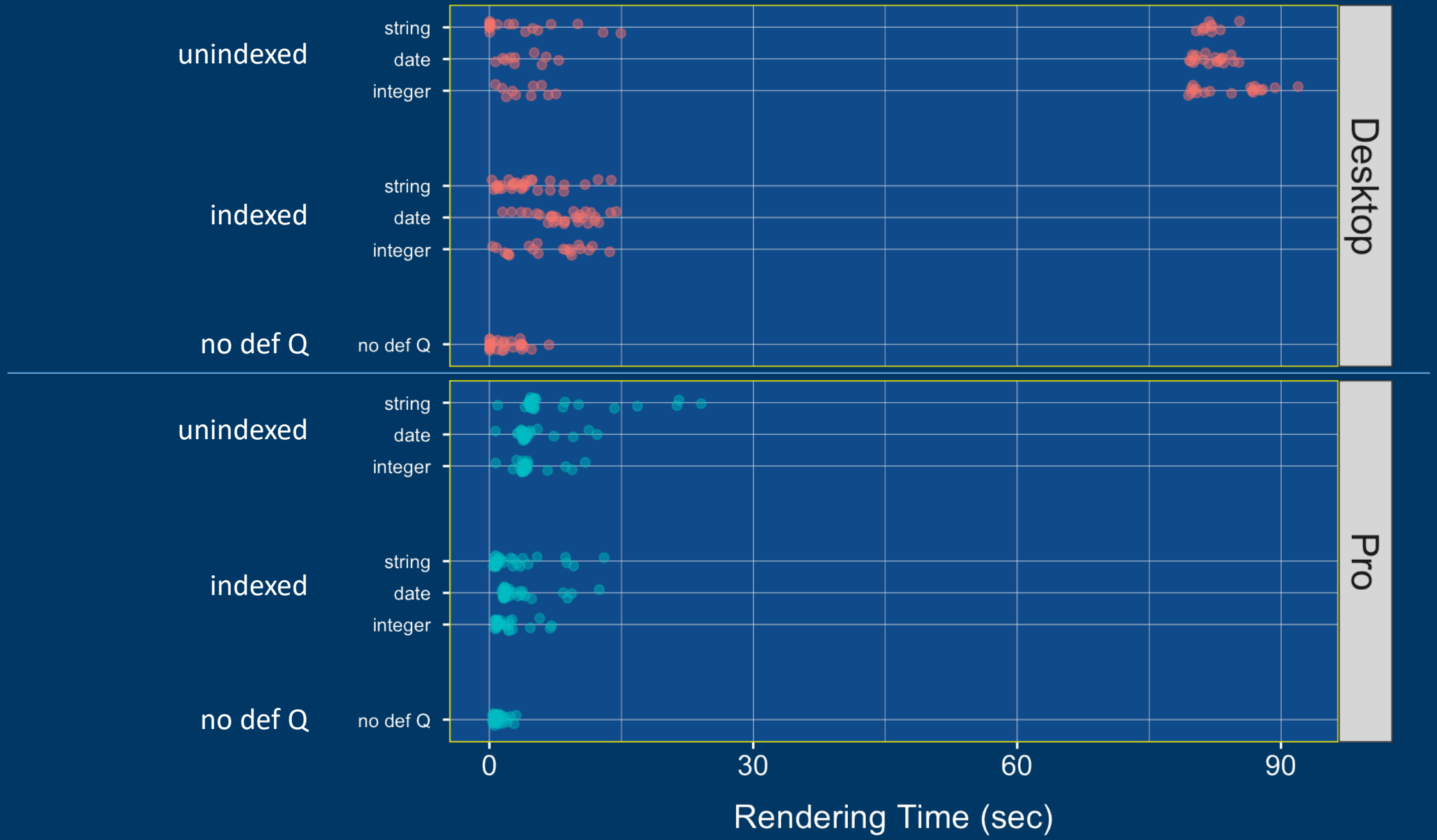


Definition Query Results

Definition Query Results



Definition Query Results



Data Source Results

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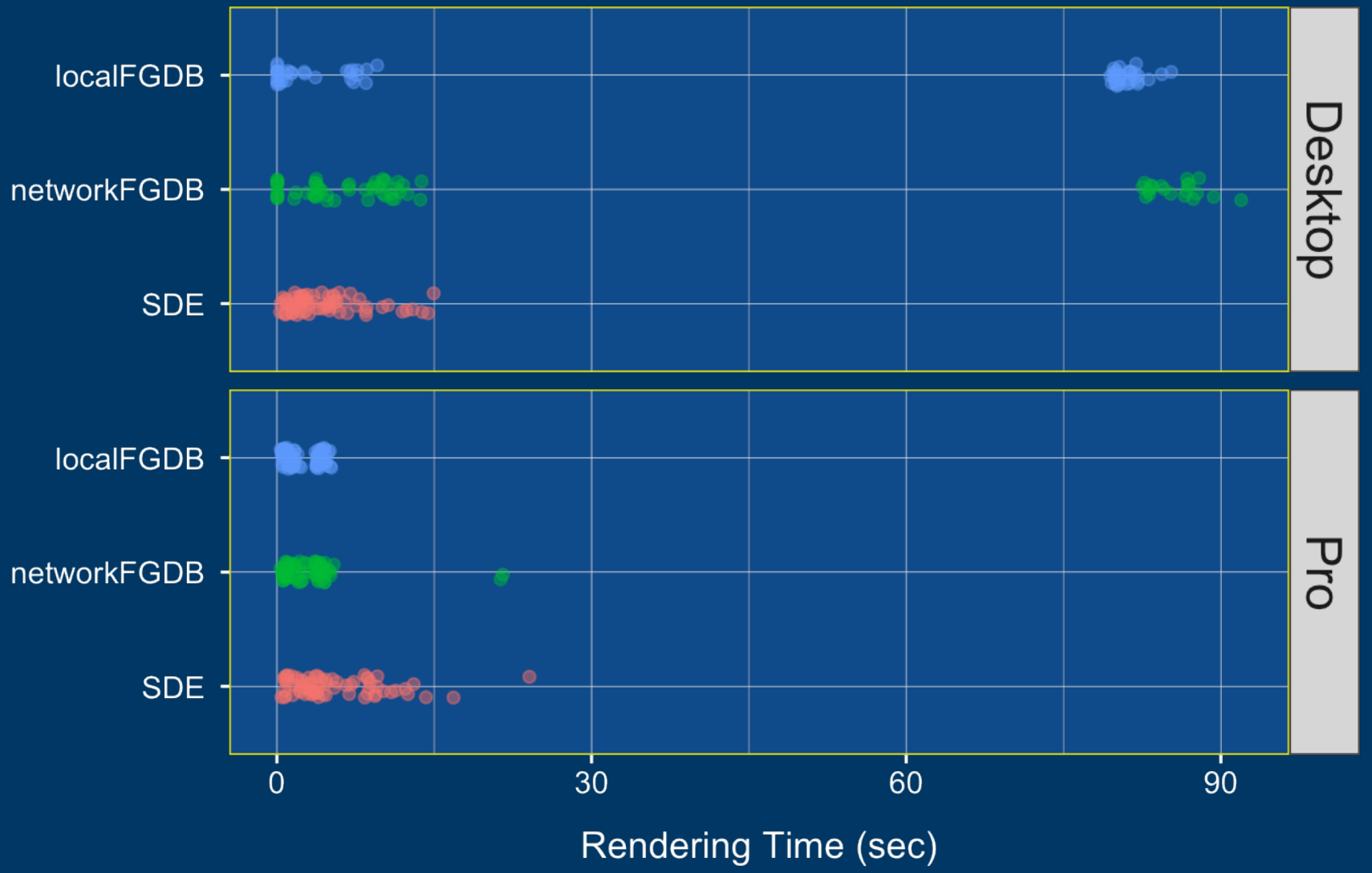
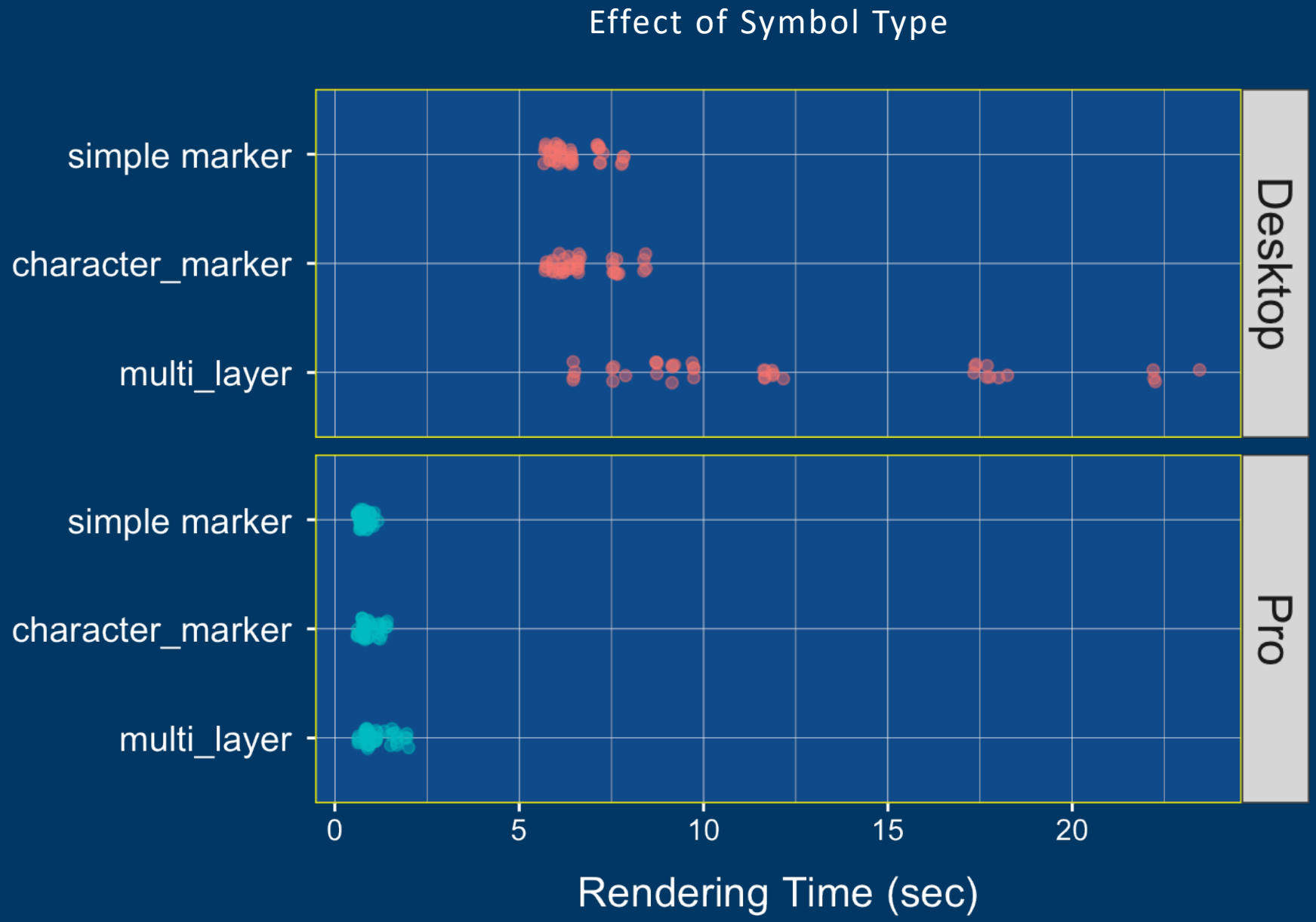


Symbology Results

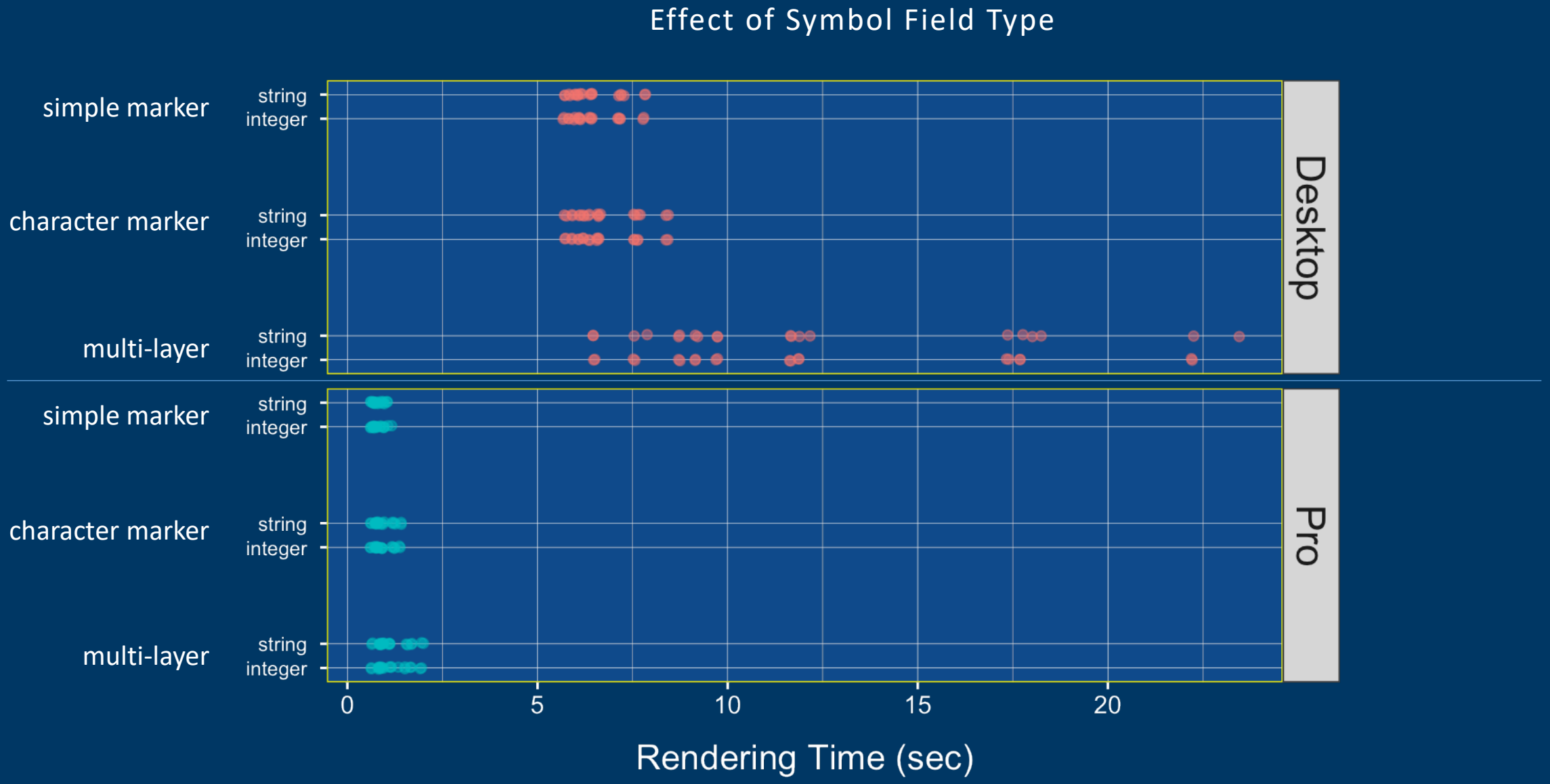
Data Source: **local FGDB**

Definition Query: **integer query field indexed**

Symbology Results

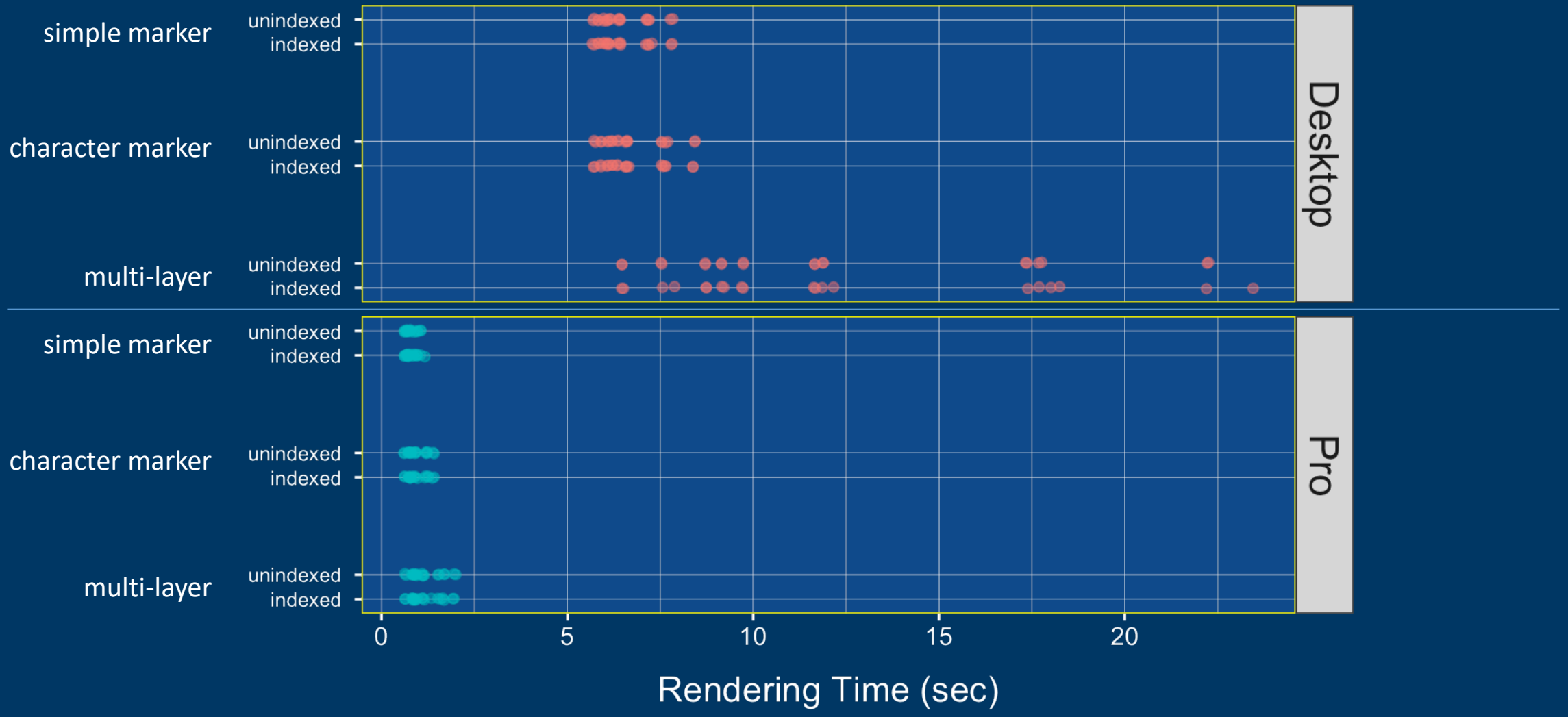


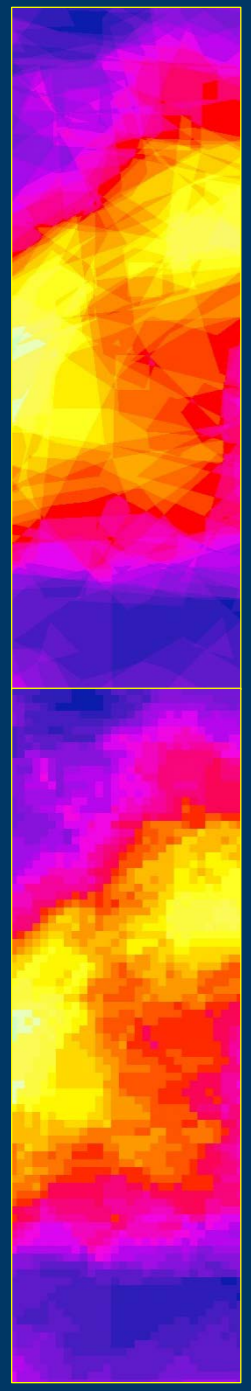
Symbology Results



Symbology Results

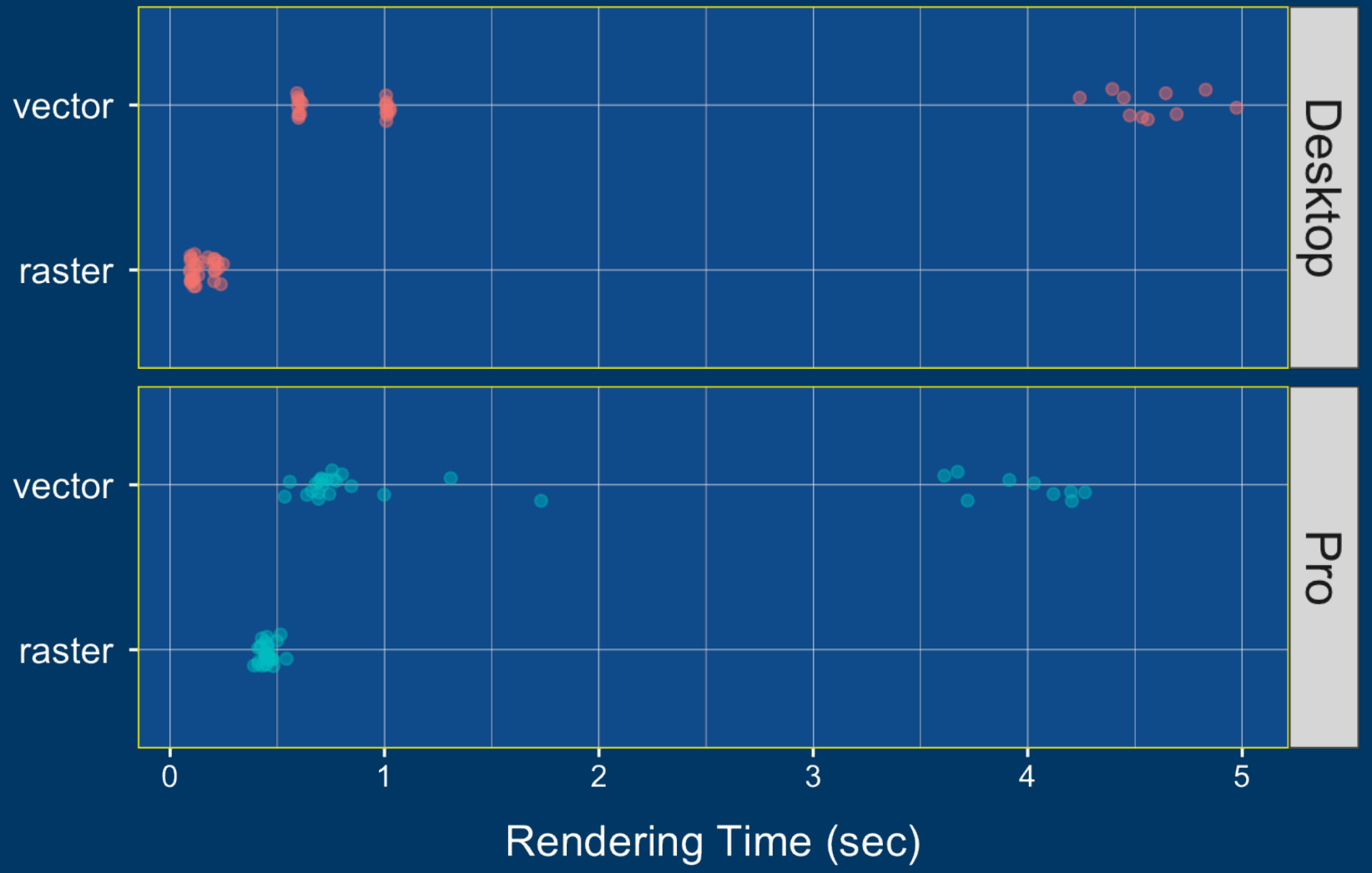
Effect of Symbol Field Indexing



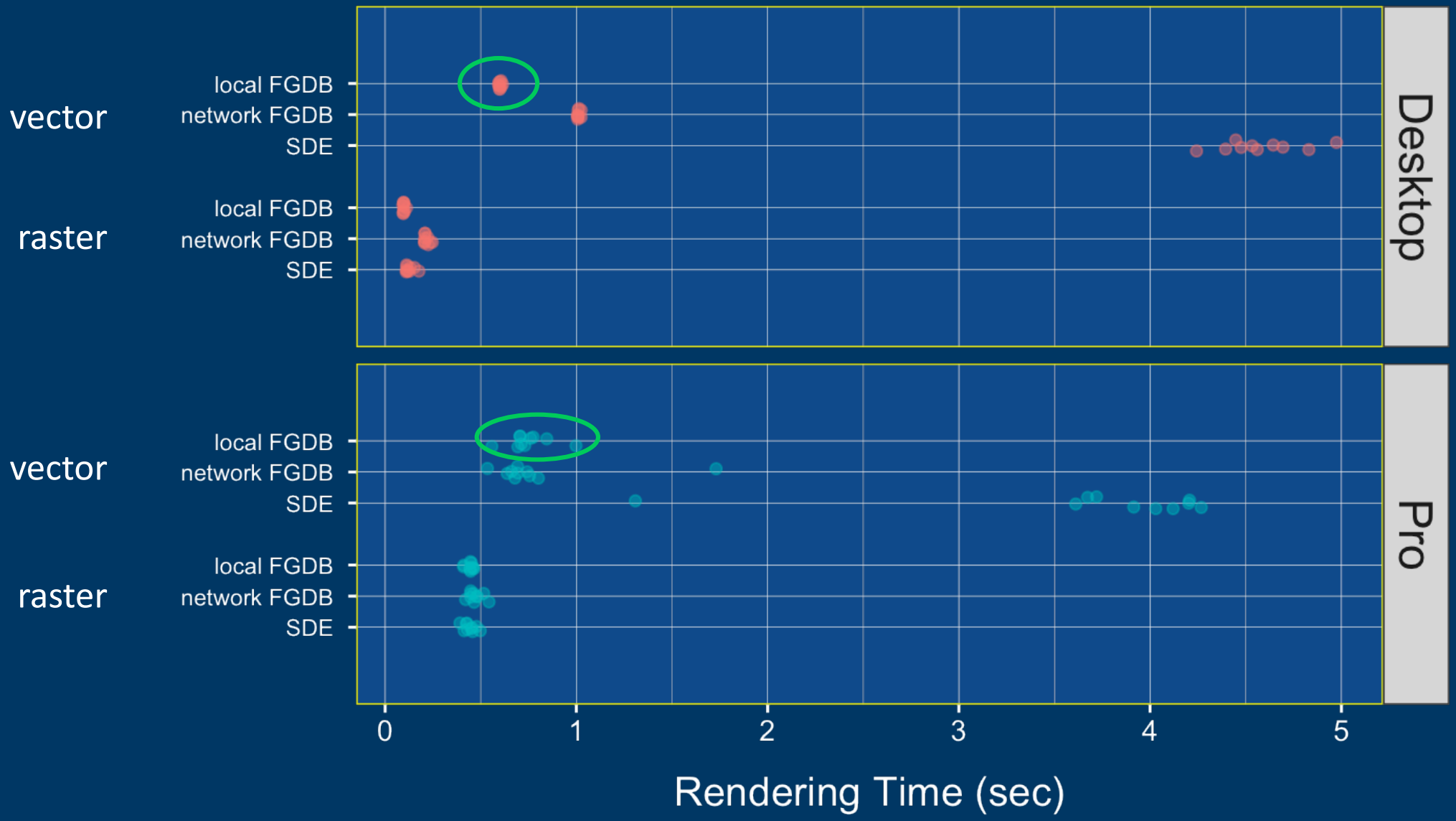


Vector vs Raster Results

Vector *vs.* Raster Results

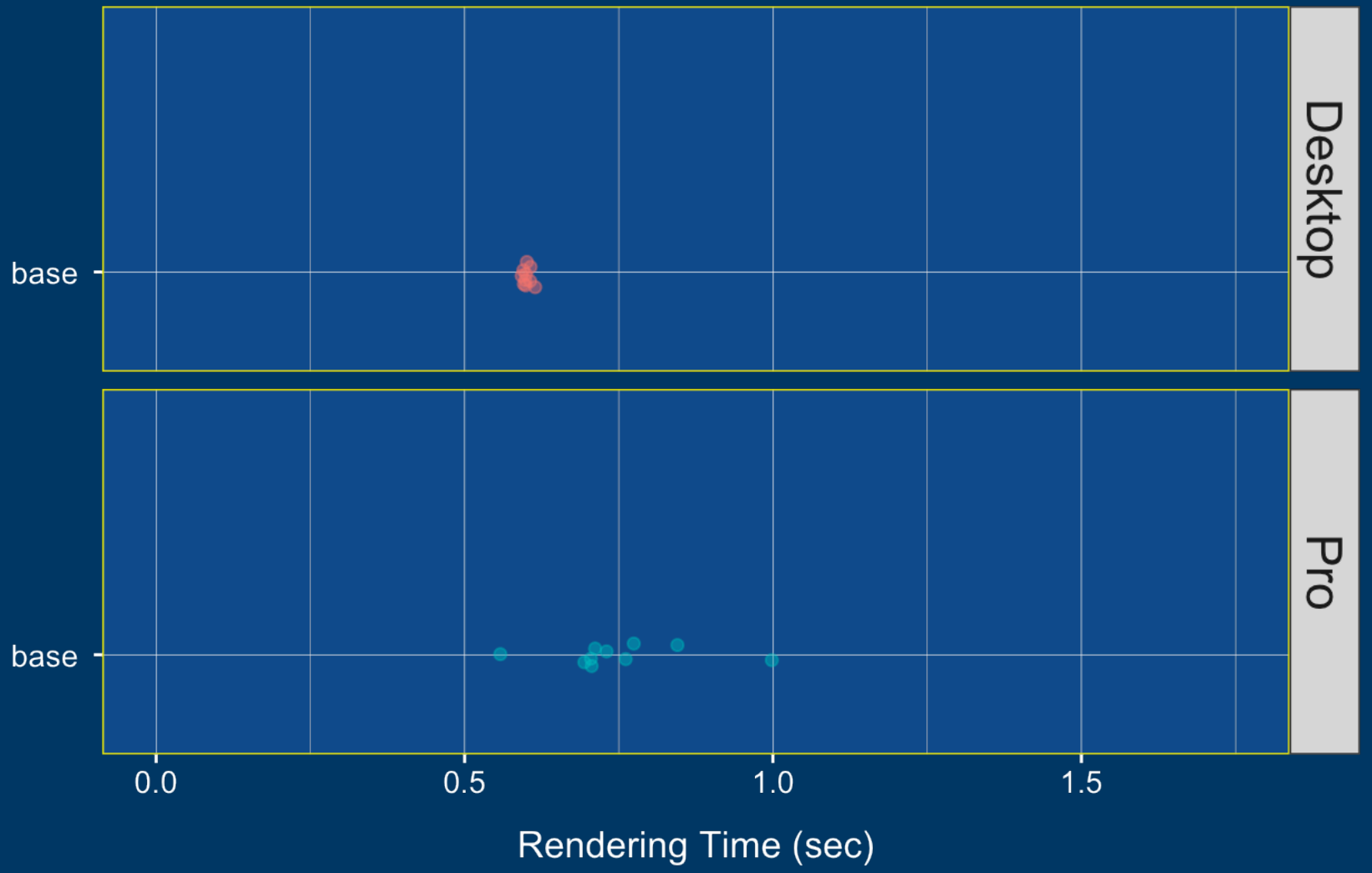


Vector *vs.* Raster Results



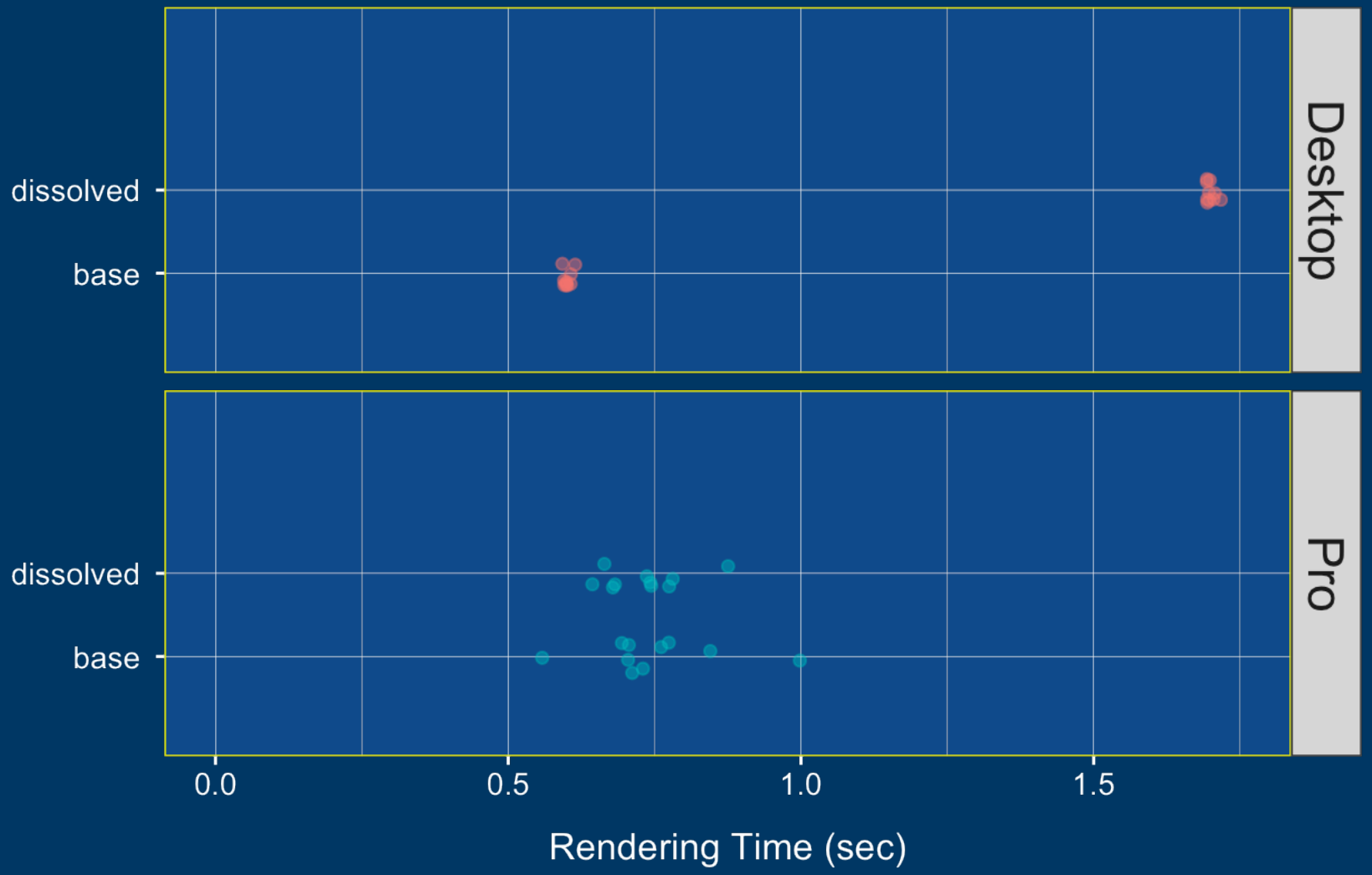
Rendering Modified Kelp Data

Data Source: local FGDB
Data Format: vector



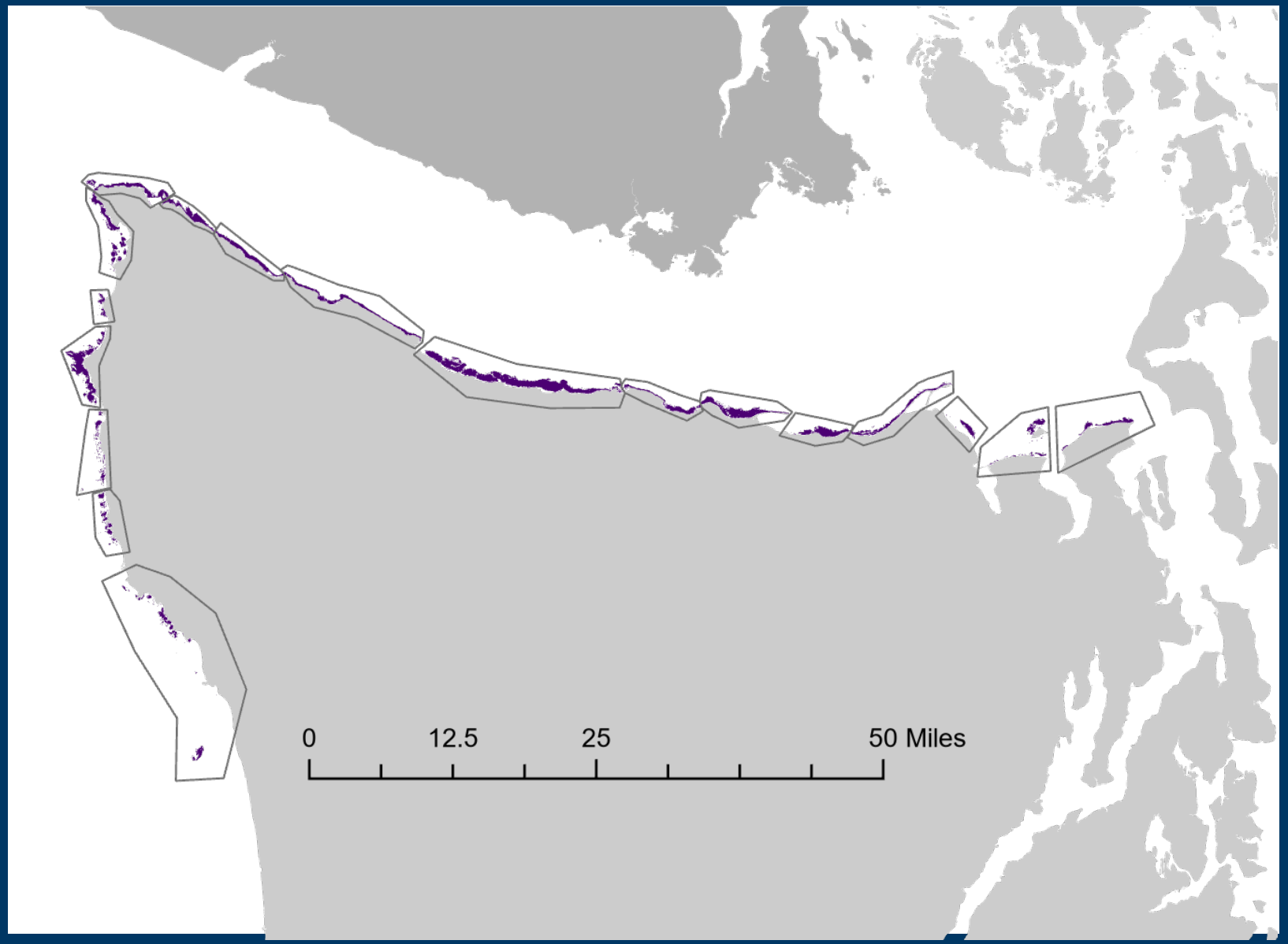
Rendering Modified Kelp Data

Data Source: local FGDB
Data Format: vector



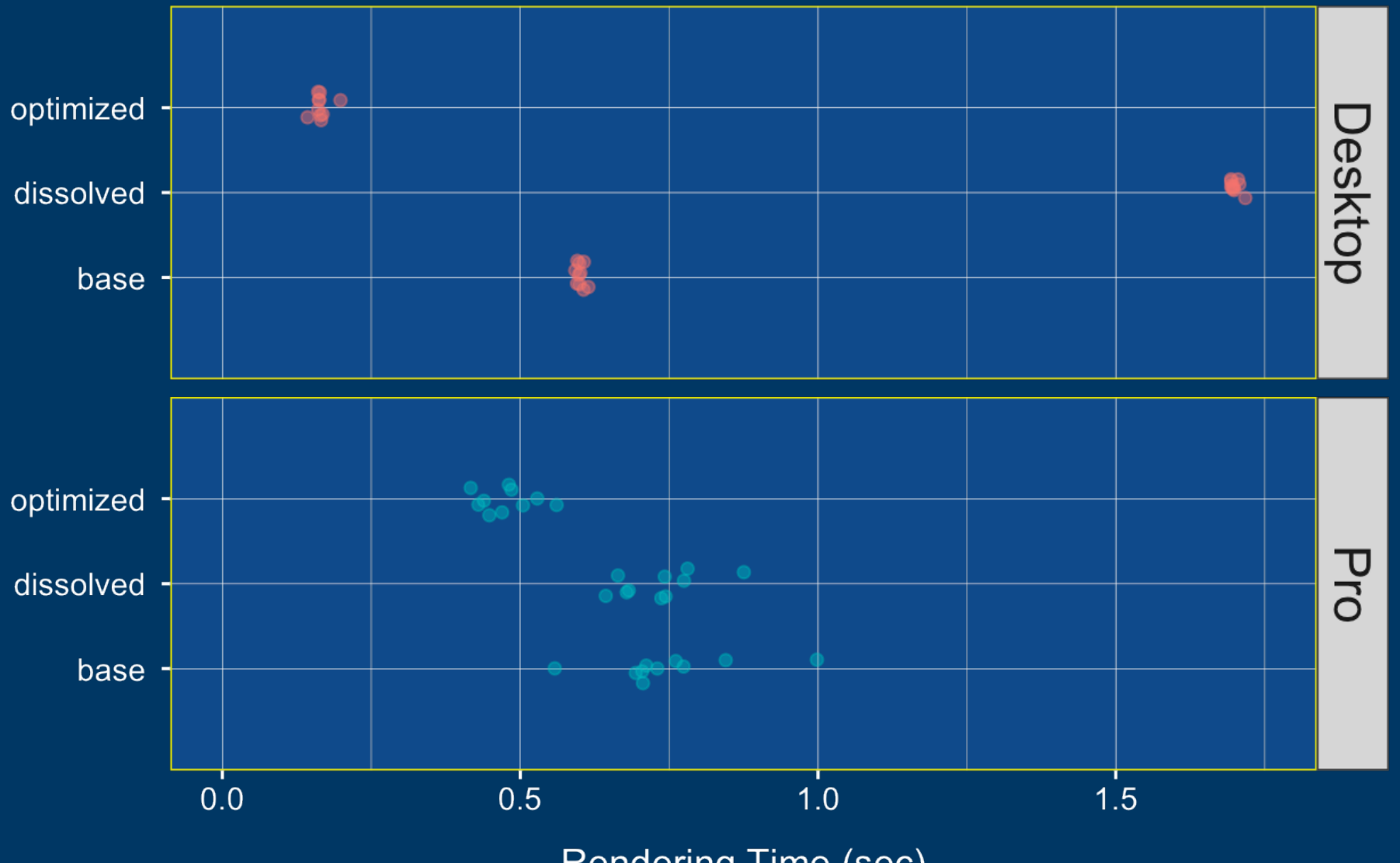
Optimizing Kelp Layer

Dissolving within sub-areas



Rendering Modified Kelp Data

Data Source: local FGDB
Data Format: vector



Summary

Cause of extremely poor rendering performance identified:

1. use of definition query on
2. unindexed field from
3. FGDB with
4. Desktop

Gives 60+ second hit to rendering performance.

Best Practices
for Large Data Rendering

1. If using def Q,
   - use index (gain up to 60 seconds in Desktop, 10 seconds in Pro)
   - use integer query field (5 seconds in Pro)
2. restructure data to avoid def Q (5-10 seconds)
3. Avoid multi-layer symbols (15 seconds Desktop, 0.5 second Pro)
4. Use raster format for complex, fine-scale data (0.5 second)

Other Findings

- Index on symbology field has no effect
- Pro generally renders faster than Desktop, but
  Raster data rendered faster in Desktop than Pro (0.25 second)
- SDE data rendered relatively poorly for complex vector data (multi-part features?)