

Firefly CSS Style System

Complete Documentation & Implementation Guide

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A CSS recreation of Esri's ArcGIS Firefly cartographic style with Dark & Light Mode support

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Introduction

The Firefly CSS Style System is a complete recreation of Esri's popular Firefly cartographic style, implemented entirely in CSS. Originally designed for ArcGIS Pro as a .stylx file, this implementation brings the distinctive glowing aesthetic to any web mapping application with support for both dark and light backgrounds.

Key Features

- **20-Color Spectral Palette:** Full recreation of the original Firefly color wheel
- **Multiple Symbol Types:** Points, polygons, and lines with authentic glow effects
- **Animation Support:** Shimmer and twinkle effects for enhanced visibility
- **Dark & Light Mode:** Optimized versions for both dark and light map backgrounds

- **Library Agnostic:** Works with Leaflet, Mapbox, OpenLayers, and custom solutions
- **Performance Optimized:** Hardware-accelerated CSS with minimal overhead
- **Accessible:** Color-blind friendly options and high contrast support

What Makes Firefly Special

The Firefly style honors Tobler's First Law of Geography: *"everything is related to everything else, but near things are more related than distant things."* The radial glow effect visually represents this concept by showing influence areas around geographic features.

Quick Start

1. Include the CSS

Copy the complete CSS from the "Complete CSS File" section below.

2. Basic Usage

Dark Mode (Original):

```
<!-- Point -->
<div class="firefly-point firefly-point-standard firefly-point-md firefly-color-8"></div>

<!-- Polygon -->
<div class="firefly-polygon firefly-polygon-standard firefly-color-11">Content</div>

<!-- Line -->
<div class="firefly-line firefly-color-15"></div>
```

Light Mode:

```
<!-- Point -->
<div class="firefly-light-point firefly-light-point-standard firefly-light-point-md
firefly-light-color-8"></div>

<!-- Polygon -->
<div class="firefly-light-polygon firefly-light-polygon-standard firefly-light-color-11">Content</div>

<!-- Line -->
<div class="firefly-light-line firefly-light-color-15"></div>
```

3. Essential Requirements

Dark Mode:

- **Dark Background:** Use backgrounds darker than #333333 for optimal visibility
- **Modern Browser:** Supports CSS custom properties and multiple box shadows
- **Performance:** Limit animated elements for better performance

Light Mode:

- **Light Background:** Use backgrounds lighter than #d0d0d0 for optimal visibility
 - **Enhanced Contrast:** Uses darker colors and shadow effects
 - **Higher Performance Cost:** More complex rendering than dark mode
-

Color Palette Reference

The Firefly palette consists of 20 carefully chosen colors distributed across the visible spectrum, available in both dark and light mode variants:

Dark Mode Colors (Original)

#	Color Name	Hex Code	RGB Values
1	Deep Pink	#ff0040	rgb(255, 0, 64)
2	Hot Pink	#ff0080	rgb(255, 0, 128)
3	Magenta	#ff00bf	rgb(255, 0, 191)
4	Fuchsia	#ff00ff	rgb(255, 0, 255)
5	Purple	#bf00ff	rgb(191, 0, 255)
6	Blue Violet	#8000ff	rgb(128, 0, 255)
7	Indigo	#4000ff	rgb(64, 0, 255)
8	Blue	#0040ff	rgb(0, 64, 255)
9	Dodger Blue	#0080ff	rgb(0, 128, 255)
10	Deep Sky Blue	#00bfff	rgb(0, 191, 255)
11	Cyan	#00ffff	rgb(0, 255, 255)

12	Spring Green	#00ffbf	rgb(0, 255, 191)
13	Bright Green	#00ff80	rgb(0, 255, 128)
14	Lime Green	#00ff40	rgb(0, 255, 64)
15	Chartreuse	#40ff00	rgb(64, 255, 0)
16	Yellow Green	#80ff00	rgb(128, 255, 0)
17	Light Yellow	#bfff00	rgb(191, 255, 0)
18	Yellow	#ffff00	rgb(255, 255, 0)
19	Orange	#ffbf00	rgb(255, 191, 0)
20	Dark Orange	#ff8000	rgb(255, 128, 0)

Light Mode Colors

#	Color Name	Hex Code	RGB Values
1	Darker Deep Pink	#cc0033	rgb(204, 0, 51)
2	Darker Hot Pink	#cc0066	rgb(204, 0, 102)
3	Darker Magenta	#cc0099	rgb(204, 0, 153)
4	Darker Fuchsia	#cc00cc	rgb(204, 0, 204)
5	Darker Purple	#9900cc	rgb(153, 0, 204)
6	Darker Blue Violet	#6600cc	rgb(102, 0, 204)
7	Darker Indigo	#3300cc	rgb(51, 0, 204)
8	Darker Blue	#0033cc	rgb(0, 51, 204)
9	Darker Dodger Blue	#0066cc	rgb(0, 102, 204)
10	Darker Deep Sky Blue	#0099cc	rgb(0, 153, 204)
11	Darker Cyan	#00cccc	rgb(0, 204, 204)
12	Darker Spring Green	#00cc99	rgb(0, 204, 153)
13	Darker Bright Green	#00cc66	rgb(0, 204, 102)
14	Darker Lime Green	#00cc33	rgb(0, 204, 51)

15	Darker Chartreuse	#33cc00	rgb(51, 204, 0)
16	Darker Yellow Green	#66cc00	rgb(102, 204, 0)
17	Darker Light Yellow	#99cc00	rgb(153, 204, 0)
18	Darker Yellow	#cccc00	rgb(204, 204, 0)
19	Darker Orange	#cc9900	rgb(204, 153, 0)
20	Darker Dark Orange	#cc6600	rgb(204, 102, 0)

High Contrast Colors (for very light backgrounds)

For white or very light backgrounds (#f8f8f8+), use these even darker variants:

#	Color Name	Hex Code	RGB Values
1	High Contrast Deep Pink	#990022	rgb(153, 0, 34)
8	High Contrast Blue	#002299	rgb(0, 34, 153)
11	High Contrast Cyan	#009999	rgb(0, 153, 153)
14	High Contrast Lime Green	#009922	rgb(0, 153, 34)
18	High Contrast Yellow	#999900	rgb(153, 153, 0)

Neutral Options

- **Dark Mode Neutral:** #ffffff (White) - For monochromatic displays
- **Light Mode Neutral:** #333333 (Dark Grey) - For monochromatic displays on light backgrounds

CSS Implementation

Core CSS Variables

```
:root {
  /* Dark Mode Colors (Original Firefly) */
  --firefly-1: #ff0040; /* Deep Pink/Red */
  --firefly-2: #ff0080; /* Hot Pink */
  --firefly-3: #ff00bf; /* Magenta */
}
```

--firefly-4: #ff00ff; /* Fuchsia */
--firefly-5: #bf00ff; /* Purple */
--firefly-6: #8000ff; /* Blue Violet */
--firefly-7: #4000ff; /* Indigo */
--firefly-8: #0040ff; /* Blue */
--firefly-9: #0080ff; /* Dodger Blue */
--firefly-10: #00bfff; /* Deep Sky Blue */
--firefly-11: #00ffff; /* Cyan */
--firefly-12: #00ffbf; /* Spring Green */
--firefly-13: #00ff80; /* Bright Green */
--firefly-14: #00ff40; /* Lime Green */
--firefly-15: #40ff00; /* Chartreuse */
--firefly-16: #80ff00; /* Yellow Green */
--firefly-17: #bfff00; /* Light Yellow */
--firefly-18: #ffff00; /* Yellow */
--firefly-19: #ffbf00; /* Orange */
--firefly-20: #ff8000; /* Dark Orange */
--firefly-neutral: #ffffff;

/* Light Mode Colors */

--firefly-light-1: #cc0033; /* Darker Deep Pink */
--firefly-light-2: #cc0066; /* Darker Hot Pink */
--firefly-light-3: #cc0099; /* Darker Magenta */
--firefly-light-4: #cc00cc; /* Darker Fuchsia */
--firefly-light-5: #9900cc; /* Darker Purple */
--firefly-light-6: #6600cc; /* Darker Blue Violet */
--firefly-light-7: #3300cc; /* Darker Indigo */
--firefly-light-8: #0033cc; /* Darker Blue */
--firefly-light-9: #0066cc; /* Darker Dodger Blue */
--firefly-light-10: #0099cc; /* Darker Deep Sky Blue */
--firefly-light-11: #00cccc; /* Darker Cyan */
--firefly-light-12: #00cc99; /* Darker Spring Green */
--firefly-light-13: #00cc66; /* Darker Bright Green */
--firefly-light-14: #00cc33; /* Darker Lime Green */
--firefly-light-15: #33cc00; /* Darker Chartreuse */
--firefly-light-16: #66cc00; /* Darker Yellow Green */
--firefly-light-17: #99cc00; /* Darker Light Yellow */
--firefly-light-18: #cccc00; /* Darker Yellow */
--firefly-light-19: #cc9900; /* Darker Orange */
--firefly-light-20: #cc6600; /* Darker Dark Orange */
--firefly-light-neutral: #333333;

/* High Contrast Colors */

--firefly-contrast-1: #990022; /* High contrast Deep Pink */

```

--firefly-contrast-2: #990044; /* High contrast Hot Pink */
--firefly-contrast-3: #990066; /* High contrast Magenta */
--firefly-contrast-4: #990099; /* High contrast Fuchsia */
--firefly-contrast-5: #660099; /* High contrast Purple */
--firefly-contrast-6: #440099; /* High contrast Blue Violet */
--firefly-contrast-7: #220099; /* High contrast Indigo */
--firefly-contrast-8: #002299; /* High contrast Blue */
--firefly-contrast-9: #004499; /* High contrast Dodger Blue */
--firefly-contrast-10: #006699; /* High contrast Deep Sky Blue */
--firefly-contrast-11: #009999; /* High contrast Cyan */
--firefly-contrast-12: #009966; /* High contrast Spring Green */
--firefly-contrast-13: #009944; /* High contrast Bright Green */
--firefly-contrast-14: #009922; /* High contrast Lime Green */
--firefly-contrast-15: #229900; /* High contrast Chartreuse */
--firefly-contrast-16: #449900; /* High contrast Yellow Green */
--firefly-contrast-17: #669900; /* High contrast Light Yellow */
--firefly-contrast-18: #999900; /* High contrast Yellow */
--firefly-contrast-19: #996600; /* High contrast Orange */
--firefly-contrast-20: #994400; /* High contrast Dark Orange */
--firefly-contrast-neutral: #000000;
}

```

Base Classes

/* Dark Mode Base Classes */

```

.firefly-point {
  position: relative;
  border-radius: 50%;
  z-index: 10;
  transition: all 0.3s ease;
}

```

```

.firefly-polygon {
  position: relative;
  z-index: 5;
  transition: all 0.3s ease;
}

```

/* Light Mode Base Classes */

```

.firefly-light-point {
  position: relative;
  border-radius: 50%;
  z-index: 10;
  transition: all 0.3s ease;
}

```

```
}  
  
.firefly-light-polygon {  
  position: relative;  
  z-index: 5;  
  transition: all 0.3s ease;  
}
```

Point Symbols

Dark Mode Points

Standard Points

```
.firefly-point-standard {  
  background: radial-gradient(circle, currentColor 0%, currentColor 40%, transparent 70%);  
  box-shadow:  
    0 0 10px currentColor,  
    0 0 20px currentColor,  
    0 0 40px currentColor,  
    inset 0 0 10px rgba(255, 255, 255, 0.2);  
}
```

Shimmer/Twinkle Points

```
.firefly-point-shimmer {  
  background: radial-gradient(circle, currentColor 0%, currentColor 30%, transparent 60%);  
  box-shadow:  
    0 0 5px currentColor,  
    0 0 15px currentColor,  
    0 0 30px currentColor,  
    0 0 60px currentColor,  
    inset 0 0 15px rgba(255, 255, 255, 0.4);  
  animation: firefly-twinkle 2s ease-in-out infinite alternate;  
}
```

```
@keyframes firefly-twinkle {  
  0% {  
    box-shadow:  
      0 0 5px currentColor,  
      0 0 15px currentColor,  
      0 0 30px currentColor,
```



```

        0 0 60px currentColor,
        inset 0 0 15px rgba(255, 255, 255, 0.4);
    transform: scale(1);
}
100% {
    box-shadow:
        0 0 10px currentColor,
        0 0 25px currentColor,
        0 0 50px currentColor,
        0 0 100px currentColor,
        inset 0 0 20px rgba(255, 255, 255, 0.6);
    transform: scale(1.1);
}
}

```

Point Sizes

```

.firefly-point-xs { width: 4px; height: 4px; } /* Very small */
.firefly-point-sm { width: 8px; height: 8px; } /* Small */
.firefly-point-md { width: 12px; height: 12px; } /* Medium */
.firefly-point-lg { width: 20px; height: 20px; } /* Large */
.firefly-point-xl { width: 32px; height: 32px; } /* Extra large */

```

/* Light mode uses same sizes */

```

.firefly-light-point-xs { width: 4px; height: 4px; }
.firefly-light-point-sm { width: 8px; height: 8px; }
.firefly-light-point-md { width: 12px; height: 12px; }
.firefly-light-point-lg { width: 20px; height: 20px; }
.firefly-light-point-xl { width: 32px; height: 32px; }

```

Usage Examples

Dark Mode:

<!-- Basic point -->

```
<div class="firefly-point firefly-point-standard firefly-point-md firefly-color-8"></div>
```

<!-- Animated shimmer point -->

```
<div class="firefly-point firefly-point-shimmer firefly-point-lg firefly-color-11"></div>
```

<!-- Large emphasis point -->

```
<div class="firefly-point firefly-point-standard firefly-point-xl firefly-color-1"></div>
```

Polygon Symbols

Dark Mode Polygons

Standard Polygons (Outer Glow)

```
.firefly-polygon-standard {  
  background: rgba(0, 0, 0, 0.1);  
  border: 2px solid currentColor;  
  box-shadow:  
    0 0 10px currentColor,  
    0 0 20px currentColor,  
    inset 0 0 10px rgba(255, 255, 255, 0.05);  
}
```

Best for: Isolated features, administrative boundaries, geographic regions

Inner Glow Polygons

```
.firefly-polygon-inner {  
  background: linear-gradient(  
    45deg,  
    transparent 0%,  
    rgba(255, 255, 255, 0.05) 50%,  
    transparent 100%  
  );  
  border: 1px solid currentColor;  
  box-shadow:  
    inset 0 0 15px currentColor,  
    inset 0 0 30px currentColor;  
}
```

Best for: Choropleth maps, adjacent areas, hexbin visualizations

Usage Examples

Dark Mode:

```
<!-- Standard polygon -->  
<div class="firefly-polygon firefly-polygon-standard firefly-color-15">  
  <!-- Your polygon content -->  
</div>
```

```
<!-- Inner glow for adjacent polygons -->
<div class="firefly-polygon firefly-polygon-inner firefly-color-3">
  <!-- Your polygon content -->
</div>
```

Line Symbols

Dark Mode Lines

Solid Lines

```
.firefly-line {
  position: relative;
  height: 2px;
  background: currentColor;
  box-shadow:
    0 0 5px currentColor,
    0 0 10px currentColor,
    0 0 20px currentColor;
}
```

Dashed Lines

```
.firefly-line-dashed {
  position: relative;
  height: 2px;
  background: repeating-linear-gradient(
    to right,
    currentColor 0px,
    currentColor 10px,
    transparent 10px,
    transparent 20px
  );
  box-shadow:
    0 0 5px currentColor,
    0 0 10px currentColor,
    0 0 20px currentColor;
}
```

Usage Examples

Dark Mode:

```
<!-- Solid glowing line -->
<div class="firefly-line firefly-color-12"></div>

<!-- Dashed glowing line -->
<div class="firefly-line-dashed firefly-color-18"></div>
```

Light Mode Implementation

The light mode adaptation transforms the Firefly style for use on light backgrounds by using darker colors and inverted shadow effects.

Key Adaptations for Light Mode

1. **Color Transformation:** All colors are darkened by approximately 20% for better visibility
2. **Shadow Inversion:** Uses drop shadows instead of glows for depth perception
3. **Enhanced Borders:** Added borders for definition against light backgrounds
4. **Multi-layered Effects:** Combines outer shadows with inner highlights

Light Mode Points

Standard Light Mode Points

```
.firefly-light-point-standard {
  background: radial-gradient(circle, currentColor 0%, currentColor 50%, rgba(255,255,255,0.8)
80%, transparent 100%);
  box-shadow:
    0 0 8px rgba(0,0,0,0.3),
    0 0 15px currentColor,
    0 0 25px rgba(0,0,0,0.1),
    inset 0 0 8px rgba(0,0,0,0.2),
    inset 0 0 15px rgba(255,255,255,0.6);
  border: 1px solid rgba(0,0,0,0.2);
}
```

Enhanced Light Mode Points

```
.firefly-light-point-enhanced {
  background: radial-gradient(circle, currentColor 0%, currentColor 40%, rgba(255,255,255,0.9)
70%, transparent 90%);
  box-shadow:
    0 0 10px rgba(0,0,0,0.4),
```

```

    0 0 20px currentColor,
    0 0 35px rgba(0,0,0,0.2),
    inset 0 0 10px rgba(0,0,0,0.3),
    inset 0 0 20px rgba(255,255,255,0.8);
border: 2px solid rgba(0,0,0,0.3);
}

```

Shimmer Light Mode Points

```

.firefly-light-point-shimmer {
  background: radial-gradient(circle, currentColor 0%, currentColor 35%, rgba(255,255,255,0.7)
65%, transparent 85%);
  box-shadow:
    0 0 8px rgba(0,0,0,0.3),
    0 0 18px currentColor,
    0 0 30px rgba(0,0,0,0.2),
    inset 0 0 12px rgba(0,0,0,0.25),
    inset 0 0 18px rgba(255,255,255,0.7);
border: 1px solid rgba(0,0,0,0.25);
animation: firefly-light-twinkle 2.5s ease-in-out infinite alternate;
}

```

```

@keyframes firefly-light-twinkle {
  0% {
    box-shadow:
      0 0 8px rgba(0,0,0,0.3),
      0 0 18px currentColor,
      0 0 30px rgba(0,0,0,0.2),
      inset 0 0 12px rgba(0,0,0,0.25),
      inset 0 0 18px rgba(255,255,255,0.7);
    transform: scale(1);
  }
  100% {
    box-shadow:
      0 0 12px rgba(0,0,0,0.4),
      0 0 25px currentColor,
      0 0 45px rgba(0,0,0,0.3),
      inset 0 0 15px rgba(0,0,0,0.35),
      inset 0 0 25px rgba(255,255,255,0.8);
    transform: scale(1.08);
  }
}

```

Light Mode Polygons

Standard Light Polygons

```
.firefly-light-polygon-standard {  
  background: rgba(255, 255, 255, 0.3);  
  border: 2px solid currentColor;  
  box-shadow:  
    0 0 8px rgba(0,0,0,0.2),  
    0 0 15px currentColor,  
    inset 0 0 10px rgba(255,255,255,0.6),  
    inset 0 0 20px rgba(0,0,0,0.1);  
}
```

Enhanced Visibility Polygons

```
.firefly-light-polygon-enhanced {  
  background: rgba(255, 255, 255, 0.5);  
  border: 3px solid currentColor;  
  box-shadow:  
    0 0 12px rgba(0,0,0,0.3),  
    0 0 20px currentColor,  
    0 0 30px rgba(0,0,0,0.1),  
    inset 0 0 15px rgba(255,255,255,0.7),  
    inset 0 0 25px rgba(0,0,0,0.15);  
}
```

Inner Glow Light Polygons

```
.firefly-light-polygon-inner {  
  background: linear-gradient(  
    45deg,  
    rgba(255,255,255,0.8) 0%,  
    rgba(0,0,0,0.05) 50%,  
    rgba(255,255,255,0.8) 100%  
  );  
  border: 2px solid currentColor;  
  box-shadow:  
    inset 0 0 12px currentColor,  
    inset 0 0 20px rgba(0,0,0,0.1),  
    0 0 5px rgba(0,0,0,0.2);  
}
```

Light Mode Lines

Solid Light Lines

```
.firefly-light-line {
  position: relative;
  height: 3px;
  background: currentColor;
  box-shadow:
    0 0 5px rgba(0,0,0,0.3),
    0 0 10px currentColor,
    0 0 15px rgba(0,0,0,0.2);
  border-radius: 1px;
}
```

Dashed Light Lines

```
.firefly-light-line-dashed {
  position: relative;
  height: 3px;
  background: repeating-linear-gradient(
    to right,
    currentColor 0px,
    currentColor 12px,
    transparent 12px,
    transparent 24px
  );
  box-shadow:
    0 0 5px rgba(0,0,0,0.3),
    0 0 10px currentColor,
    0 0 15px rgba(0,0,0,0.2);
  border-radius: 1px;
}
```

Light Mode Usage Examples

<!-- Standard light mode point -->

```
<div class="firefly-light-point firefly-light-point-standard firefly-light-point-md
firefly-light-color-8"></div>
```

<!-- High contrast point for very light backgrounds -->

```
<div class="firefly-light-point firefly-light-point-enhanced firefly-light-point-md
firefly-contrast-color-8"></div>
```

<!-- Light mode polygon -->

```
<div class="firefly-light-polygon firefly-light-polygon-standard firefly-light-color-11">Content</div>
```

```
<!-- Light mode line -->
<div class="firefly-light-line firefly-light-color-15"></div>
```

Background Compatibility Guide

Light Mode Background Guidelines:

Background Type	Hex Range	Recommended Colors
Very Light Grey	#f8f8f8 to #ffffff	High contrast colors
Light Grey	#f0f0f0 to #f8f8f8	Standard light colors
Medium Light Grey	#e0e0e0 to #f0f0f0	Standard light colors
Medium Grey	#d0d0d0 to #e0e0e0	Either light or dark mode

Map Library Integration

Leaflet

Dark Mode

```
// Point markers
const marker = L.marker([lat, lng], {
  icon: L.divIcon({
    html: '<div class="firefly-point firefly-point-standard firefly-point-md firefly-color-8"></div>',
    className: 'firefly-marker',
    iconSize: [20, 20],
    iconAnchor: [10, 10]
  })
});

// Polygon styling
const polygon = L.polygon(coordinates, {
  className: 'firefly-polygon firefly-polygon-standard firefly-color-11',
  fillOpacity: 0,
  weight: 0
});

// Polyline styling
const polyline = L.polyline(coordinates, {
```



```
    className: 'firefly-line firefly-color-15',  
    weight: 2,  
    opacity: 1  
  });
```

Light Mode

```
// Light mode point markers  
const lightMarker = L.marker([lat, lng], {  
  icon: L.divIcon({  
    html: '<div class="firefly-light-point firefly-light-point-enhanced firefly-light-point-md  
firefly-contrast-color-8"></div>',  
    className: 'firefly-light-marker',  
    iconSize: [20, 20],  
    iconAnchor: [10, 10]  
  })  
});
```

```
// Light mode polygon styling  
const lightPolygon = L.polygon(coordinates, {  
  className: 'firefly-light-polygon firefly-light-polygon-standard firefly-light-color-11',  
  fillOpacity: 0,  
  weight: 0  
});
```

Mapbox GL JS

Dark Mode

```
// HTML markers for points  
const el = document.createElement('div');  
el.className = 'firefly-point firefly-point-shimmer firefly-point-lg firefly-color-15';  
new mapboxgl.Marker(el)  
  .setLngLat([lng, lat])  
  .addTo(map);
```

```
// Layer styling for polygons  
map.addLayer({  
  'id': 'firefly-polygons',  
  'type': 'fill',  
  'source': 'polygon-source',  
  'paint': {  
    'fill-color': '#00ffff', // firefly-color-11  
    'fill-opacity': 0.1,
```

```

        'fill-outline-color': '#00ffff'
    }
});

// Add glow effect via separate layer
map.addLayer({
  'id': 'firefly-polygon-glow',
  'type': 'line',
  'source': 'polygon-source',
  'paint': {
    'line-color': '#00ffff',
    'line-width': 3,
    'line-blur': 10
  }
});

```

Light Mode

```

// Light mode HTML markers
const lightEl = document.createElement('div');
lightEl.className = 'firefly-light-point firefly-light-point-enhanced firefly-light-point-lg firefly-light-color-15';
new mapboxgl.Marker(lightEl)
  .setLngLat([lng, lat])
  .addTo(map);

// Light mode polygon layers
map.addLayer({
  'id': 'firefly-light-polygons',
  'type': 'fill',
  'source': 'polygon-source',
  'paint': {
    'fill-color': '#00cccc', // firefly-light-color-11
    'fill-opacity': 0.3,
    'fill-outline-color': '#00cccc'
  }
});

```

OpenLayers

Dark Mode

```

// Point overlays
const element = document.createElement('div');

```

```

element.className = 'firefly-point firefly-point-standard firefly-point-md firefly-color-12';
const overlay = new ol.Overlay({
  element: element,
  position: ol.proj.fromLonLat([lng, lat]),
  positioning: 'center-center'
});
map.addOverlay(overlay);

// Vector styling
const style = new ol.style.Style({
  image: new ol.style.Circle({
    radius: 6,
    fill: new ol.style.Fill({color: '#00ff80'}),
    stroke: new ol.style.Stroke({color: '#00ff80', width: 2})
  })
});

```

Light Mode

```

// Light mode point overlays
const lightElement = document.createElement('div');
lightElement.className = 'firefly-light-point firefly-light-point-standard firefly-light-point-md firefly-light-color-12';
const lightOverlay = new ol.Overlay({
  element: lightElement,
  position: ol.proj.fromLonLat([lng, lat]),
  positioning: 'center-center'
});
map.addOverlay(lightOverlay);

```

Performance & Best Practices

Performance Optimization

Hardware Acceleration

```

.firefly-point, .firefly-polygon, .firefly-light-point, .firefly-light-polygon {
  transform: translateZ(0); /* Forces hardware acceleration */
  will-change: transform; /* Hint to browser for optimization */
}

```

Memory Management

- **Limit animations:** Use shimmer effects sparingly (<50 elements)
- **Viewport culling:** Hide off-screen elements
- **CSS containment:** Use `contain: layout style` for isolated elements
- **Light mode consideration:** Light mode uses more complex shadows - limit to <100 elements

Large Dataset Optimization

```
/* Optimize for large datasets */
.firefly-optimized {
  contain: layout style;
  transform: translateZ(0);
  backface-visibility: hidden;
}

/* Disable animations on low-end devices */
@media (prefers-reduced-motion: reduce) {
  .firefly-point-shimmer,
  .firefly-light-point-shimmer {
    animation: none;
  }
}

/* Responsive considerations */
@media (max-width: 768px) {
  /* Simplify effects on mobile */
  .firefly-point-shimmer,
  .firefly-light-point-shimmer {
    animation: none;
  }
}
```

Visual Design Guidelines

Background Requirements

Dark Mode:

- **Optimal:** #1a1a1a to #2a2a2a (very dark gray)
- **Acceptable:** #333333 to #444444 (medium dark)
- **Avoid:** Light backgrounds (>#666666)

Light Mode:

- **Optimal:** #f0f0f0 to #f8f8f8 (light grey)

- **Acceptable:** #e8e8e8 to #f0f0f0 (medium-light grey)
- **Very Light:** #f8f8f8 to #ffffff (use high contrast colors)

Color Selection Rules

Thematic Mapping:

- Use maximum 6 consecutive colors
- Avoid spanning multiple hues
- Example: Colors 8-13 for blue-green range

Categorical Data:

- Use opposite colors for contrast
- Dark mode: Color 8 (blue) + Color 18 (yellow)
- Light mode: Light-color-8 + Light-color-18
- Test with color blindness simulators

Mode Selection Guide

Map Background	Recommended Mode	Color Palette
#000000 - #333333	Dark Mode	Standard Firefly colors
#333333 - #666666	Either mode	Test both palettes
#666666 - #d0d0d0	Transition zone	Light mode preferred
#d0d0d0 - #f0f0f0	Light Mode	Standard light colors
#f0f0f0 - #ffffff	Light Mode	High contrast colors

Accessibility Guidelines

Color Blindness Considerations

Vision Type	Affected Colors (Dark)	Affected Colors (Light)	Safe Alternatives
Protanopia (Red-blind)	Colors 1-5, 18-20	Light-colors 1-5, 18-20	Colors 6-17 (Blue-Green range)

Deuteranopia (Green-blind)	Colors 12-17	Light-colors 12-17	Colors 1-11, 18-20
Tritanopia (Blue-blind)	Colors 6-11	Light-colors 6-11	Colors 1-5, 12-20

High Contrast Support

```
/* High contrast support */
@media (prefers-contrast: high) {
  .firefly-point, .firefly-polygon,
  .firefly-light-point, .firefly-light-polygon {
    filter: contrast(1.5) brightness(1.2);
  }
}

/* Windows High Contrast Mode */
@media (prefers-contrast: high) and (-ms-high-contrast: active) {
  .firefly-point,
  .firefly-light-point {
    background: ButtonText !important;
    color: ButtonText !important;
  }
}
```

Motion Sensitivity

```
/* Respect user motion preferences */
@media (prefers-reduced-motion: reduce) {
  .firefly-point-shimmer,
  .firefly-light-point-shimmer {
    animation: none;
  }

  .firefly-point, .firefly-polygon,
  .firefly-light-point, .firefly-light-polygon {
    transition: none;
  }
}
```

Auto Mode Detection

```
/* Automatically switch based on system preference */
@media (prefers-color-scheme: light) {
```

```

/* Use light mode classes by default */
:root {
  --firefly-auto-1: var(--firefly-light-1);
  --firefly-auto-2: var(--firefly-light-2);
  /* ... continue for all colors ... */
}
}

@media (prefers-color-scheme: dark) {
  /* Use dark mode classes by default */
  :root {
    --firefly-auto-1: var(--firefly-1);
    --firefly-auto-2: var(--firefly-2);
    /* ... continue for all colors ... */
  }
}

```

Complete CSS File

Here's the complete CSS implementation with both dark and light modes ready to use:

```

/* ===== FIREFLY COLOR PALETTE ===== */
:root {
  /* Dark Mode Colors (Original Firefly) */
  --firefly-1: #ff0040; /* Deep Pink/Red */
  --firefly-2: #ff0080; /* Hot Pink */
  --firefly-3: #ff00bf; /* Magenta */
  --firefly-4: #ff00ff; /* Fuchsia */
  --firefly-5: #bf00ff; /* Purple */
  --firefly-6: #8000ff; /* Blue Violet */
  --firefly-7: #4000ff; /* Indigo */
  --firefly-8: #0040ff; /* Blue */
  --firefly-9: #0080ff; /* Dodger Blue */
  --firefly-10: #00bfff; /* Deep Sky Blue */
  --firefly-11: #00ffff; /* Cyan */
  --firefly-12: #00ffbf; /* Spring Green */
  --firefly-13: #00ff80; /* Bright Green */
  --firefly-14: #00ff40; /* Lime Green */
  --firefly-15: #40ff00; /* Chartreuse */
  --firefly-16: #80ff00; /* Yellow Green */
  --firefly-17: #bfff00; /* Light Yellow */
  --firefly-18: #ffff00; /* Yellow */
}

```

--firefly-19: #ffbf00; /* Orange */
--firefly-20: #ff8000; /* Dark Orange */
--firefly-neutral: #ffffff;

/* Light Mode Colors */

--firefly-light-1: #cc0033; /* Darker Deep Pink */
--firefly-light-2: #cc0066; /* Darker Hot Pink */
--firefly-light-3: #cc0099; /* Darker Magenta */
--firefly-light-4: #cc00cc; /* Darker Fuchsia */
--firefly-light-5: #9900cc; /* Darker Purple */
--firefly-light-6: #6600cc; /* Darker Blue Violet */
--firefly-light-7: #3300cc; /* Darker Indigo */
--firefly-light-8: #0033cc; /* Darker Blue */
--firefly-light-9: #0066cc; /* Darker Dodger Blue */
--firefly-light-10: #0099cc; /* Darker Deep Sky Blue */
--firefly-light-11: #00cccc; /* Darker Cyan */
--firefly-light-12: #00cc99; /* Darker Spring Green */
--firefly-light-13: #00cc66; /* Darker Bright Green */
--firefly-light-14: #00cc33; /* Darker Lime Green */
--firefly-light-15: #33cc00; /* Darker Chartreuse */
--firefly-light-16: #66cc00; /* Darker Yellow Green */
--firefly-light-17: #99cc00; /* Darker Light Yellow */
--firefly-light-18: #cccc00; /* Darker Yellow */
--firefly-light-19: #cc9900; /* Darker Orange */
--firefly-light-20: #cc6600; /* Darker Dark Orange */
--firefly-light-neutral: #333333;

/* High Contrast Colors */

--firefly-contrast-1: #990022; /* High contrast Deep Pink */
--firefly-contrast-2: #990044; /* High contrast Hot Pink */
--firefly-contrast-3: #990066; /* High contrast Magenta */
--firefly-contrast-4: #990099; /* High contrast Fuchsia */
--firefly-contrast-5: #660099; /* High contrast Purple */
--firefly-contrast-6: #440099; /* High contrast Blue Violet */
--firefly-contrast-7: #220099; /* High contrast Indigo */
--firefly-contrast-8: #002299; /* High contrast Blue */
--firefly-contrast-9: #004499; /* High contrast Dodger Blue */
--firefly-contrast-10: #006699; /* High contrast Deep Sky Blue */
--firefly-contrast-11: #009999; /* High contrast Cyan */
--firefly-contrast-12: #009966; /* High contrast Spring Green */
--firefly-contrast-13: #009944; /* High contrast Bright Green */
--firefly-contrast-14: #009922; /* High contrast Lime Green */
--firefly-contrast-15: #229900; /* High contrast Chartreuse */
--firefly-contrast-16: #449900; /* High contrast Yellow Green */


```

--firefly-contrast-17: #669900; /* High contrast Light Yellow */
--firefly-contrast-18: #999900; /* High contrast Yellow */
--firefly-contrast-19: #996600; /* High contrast Orange */
--firefly-contrast-20: #994400; /* High contrast Dark Orange */
--firefly-contrast-neutral: #000000;
}

/* ===== BASE FIREFLY STYLES ===== */
.firefly-point {
  position: relative;
  border-radius: 50%;
  z-index: 10;
  transition: all 0.3s ease;
}

.firefly-polygon {
  position: relative;
  z-index: 5;
  transition: all 0.3s ease;
}

.firefly-light-point {
  position: relative;
  border-radius: 50%;
  z-index: 10;
  transition: all 0.3s ease;
}

.firefly-light-polygon {
  position: relative;
  z-index: 5;
  transition: all 0.3s ease;
}

/* ===== DARK MODE POINT STYLES ===== */
.firefly-point-standard {
  background: radial-gradient(circle, currentColor 0%, currentColor 40%, transparent 70%);
  box-shadow:
    0 0 10px currentColor,
    0 0 20px currentColor,
    0 0 40px currentColor,
    inset 0 0 10px rgba(255, 255, 255, 0.2);
}

```

```
.firefly-point-shimmer {
  background: radial-gradient(circle, currentColor 0%, currentColor 30%, transparent 60%);
  box-shadow:
    0 0 5px currentColor,
    0 0 15px currentColor,
    0 0 30px currentColor,
    0 0 60px currentColor,
    inset 0 0 15px rgba(255, 255, 255, 0.4);
  animation: firefly-twinkle 2s ease-in-out infinite alternate;
}
```

```
@keyframes firefly-twinkle {
  0% {
    box-shadow:
      0 0 5px currentColor,
      0 0 15px currentColor,
      0 0 30px currentColor,
      0 0 60px currentColor,
      inset 0 0 15px rgba(255, 255, 255, 0.4);
    transform: scale(1);
  }
  100% {
    box-shadow:
      0 0 10px currentColor,
      0 0 25px currentColor,
      0 0 50px currentColor,
      0 0 100px currentColor,
      inset 0 0 20px rgba(255, 255, 255, 0.6);
    transform: scale(1.1);
  }
}
```

```
/* ===== LIGHT MODE POINT STYLES ===== */
```

```
.firefly-light-point-standard {
  background: radial-gradient(circle, currentColor 0%, currentColor 50%, rgba(255,255,255,0.8)
80%, transparent 100%);
  box-shadow:
    0 0 8px rgba(0,0,0,0.3),
    0 0 15px currentColor,
    0 0 25px rgba(0,0,0,0.1),
    inset 0 0 8px rgba(0,0,0,0.2),
    inset 0 0 15px rgba(255,255,255,0.6);
  border: 1px solid rgba(0,0,0,0.2);
}
```

```
.firefly-light-point-enhanced {  
  background: radial-gradient(circle, currentColor 0%, currentColor 40%, rgba(255,255,255,0.9)  
70%, transparent 90%);  
  box-shadow:  
    0 0 10px rgba(0,0,0,0.4),  
    0 0 20px currentColor,  
    0 0 35px rgba(0,0,0,0.2),  
    inset 0 0 10px rgba(0,0,0,0.3),  
    inset 0 0 20px rgba(255,255,255,0.8);  
  border: 2px solid rgba(0,0,0,0.3);  
}
```

```
.firefly-light-point-shimmer {  
  background: radial-gradient(circle, currentColor 0%, currentColor 35%, rgba(255,255,255,0.7)  
65%, transparent 85%);  
  box-shadow:  
    0 0 8px rgba(0,0,0,0.3),  
    0 0 18px currentColor,  
    0 0 30px rgba(0,0,0,0.2),  
    inset 0 0 12px rgba(0,0,0,0.25),  
    inset 0 0 18px rgba(255,255,255,0.7);  
  border: 1px solid rgba(0,0,0,0.25);  
  animation: firefly-light-twinkle 2.5s ease-in-out infinite alternate;  
}
```

```
@keyframes firefly-light-twinkle {  
  0% {  
    box-shadow:  
      0 0 8px rgba(0,0,0,0.3),  
      0 0 18px currentColor,  
      0 0 30px rgba(0,0,0,0.2),  
      inset 0 0 12px rgba(0,0,0,0.25),  
      inset 0 0 18px rgba(255,255,255,0.7);  
    transform: scale(1);  
  }  
  100% {  
    box-shadow:  
      0 0 12px rgba(0,0,0,0.4),  
      0 0 25px currentColor,  
      0 0 45px rgba(0,0,0,0.3),  
      inset 0 0 15px rgba(0,0,0,0.35),  
      inset 0 0 25px rgba(255,255,255,0.8);  
    transform: scale(1.08);  
  }  
}
```

```
}  
}
```

```
/* Point sizes */
```

```
.firefly-point-xs { width: 4px; height: 4px; }  
.firefly-point-sm { width: 8px; height: 8px; }  
.firefly-point-md { width: 12px; height: 12px; }  
.firefly-point-lg { width: 20px; height: 20px; }  
.firefly-point-xl { width: 32px; height: 32px; }
```

```
.firefly-light-point-xs { width: 4px; height: 4px; }  
.firefly-light-point-sm { width: 8px; height: 8px; }  
.firefly-light-point-md { width: 12px; height: 12px; }  
.firefly-light-point-lg { width: 20px; height: 20px; }  
.firefly-light-point-xl { width: 32px; height: 32px; }
```

```
/* ===== DARK MODE POLYGON STYLES ===== */
```

```
.firefly-polygon-standard {  
  background: rgba(0, 0, 0, 0.1);  
  border: 2px solid currentColor;  
  box-shadow:  
    0 0 10px currentColor,  
    0 0 20px currentColor,  
    inset 0 0 10px rgba(255, 255, 255, 0.05);  
}
```

```
.firefly-polygon-inner {  
  background: linear-gradient(  
    45deg,  
    transparent 0%,  
    rgba(255, 255, 255, 0.05) 50%,  
    transparent 100%  
  );  
  border: 1px solid currentColor;  
  box-shadow:  
    inset 0 0 15px currentColor,  
    inset 0 0 30px currentColor;  
}
```

```
/* ===== LIGHT MODE POLYGON STYLES ===== */
```

```
.firefly-light-polygon-standard {  
  background: rgba(255, 255, 255, 0.3);  
  border: 2px solid currentColor;  
  box-shadow:
```

```
    0 0 8px rgba(0,0,0,0.2),
    0 0 15px currentColor,
    inset 0 0 10px rgba(255,255,255,0.6),
    inset 0 0 20px rgba(0,0,0,0.1);
}
```

```
.firefly-light-polygon-enhanced {
    background: rgba(255, 255, 255, 0.5);
    border: 3px solid currentColor;
    box-shadow:
        0 0 12px rgba(0,0,0,0.3),
        0 0 20px currentColor,
        0 0 30px rgba(0,0,0,0.1),
        inset 0 0 15px rgba(255,255,255,0.7),
        inset 0 0 25px rgba(0,0,0,0.15);
}
```

```
.firefly-light-polygon-inner {
    background: linear-gradient(
        45deg,
        rgba(255,255,255,0.8) 0%,
        rgba(0,0,0,0.05) 50%,
        rgba(255,255,255,0.8) 100%
    );
    border: 2px solid currentColor;
    box-shadow:
        inset 0 0 12px currentColor,
        inset 0 0 20px rgba(0,0,0,0.1),
        0 0 5px rgba(0,0,0,0.2);
}
```

```
/* ===== DARK MODE LINE STYLES ===== */
```

```
.firefly-line {
    position: relative;
    height: 2px;
    background: currentColor;
    box-shadow:
        0 0 5px currentColor,
        0 0 10px currentColor,
        0 0 20px currentColor;
}
```

```
.firefly-line-dashed {
    position: relative;
```

```

height: 2px;
background: repeating-linear-gradient(
  to right,
  currentColor 0px,
  currentColor 10px,
  transparent 10px,
  transparent 20px
);
box-shadow:
  0 0 5px currentColor,
  0 0 10px currentColor,
  0 0 20px currentColor;
}

/* ===== LIGHT MODE LINE STYLES ===== */
.firefly-light-line {
  position: relative;
  height: 3px;
  background: currentColor;
  box-shadow:
    0 0 5px rgba(0,0,0,0.3),
    0 0 10px currentColor,
    0 0 15px rgba(0,0,0,0.2);
  border-radius: 1px;
}

.firefly-light-line-dashed {
  position: relative;
  height: 3px;
  background: repeating-linear-gradient(
    to right,
    currentColor 0px,
    currentColor 12px,
    transparent 12px,
    transparent 24px
  );
  box-shadow:
    0 0 5px rgba(0,0,0,0.3),
    0 0 10px currentColor,
    0 0 15px rgba(0,0,0,0.2);
  border-radius: 1px;
}

/* ===== COLOR CLASSES ===== */

```

/ Dark Mode Colors */*

```
.firefly-color-1 { color: var(--firefly-1); }  
.firefly-color-2 { color: var(--firefly-2); }  
.firefly-color-3 { color: var(--firefly-3); }  
.firefly-color-4 { color: var(--firefly-4); }  
.firefly-color-5 { color: var(--firefly-5); }  
.firefly-color-6 { color: var(--firefly-6); }  
.firefly-color-7 { color: var(--firefly-7); }  
.firefly-color-8 { color: var(--firefly-8); }  
.firefly-color-9 { color: var(--firefly-9); }  
.firefly-color-10 { color: var(--firefly-10); }  
.firefly-color-11 { color: var(--firefly-11); }  
.firefly-color-12 { color: var(--firefly-12); }  
.firefly-color-13 { color: var(--firefly-13); }  
.firefly-color-14 { color: var(--firefly-14); }  
.firefly-color-15 { color: var(--firefly-15); }  
.firefly-color-16 { color: var(--firefly-16); }  
.firefly-color-17 { color: var(--firefly-17); }  
.firefly-color-18 { color: var(--firefly-18); }  
.firefly-color-19 { color: var(--firefly-19); }  
.firefly-color-20 { color: var(--firefly-20); }  
.firefly-color-neutral { color: var(--firefly-neutral); }
```

/ Light Mode Colors */*

```
.firefly-light-color-1 { color: var(--firefly-light-1); }  
.firefly-light-color-2 { color: var(--firefly-light-2); }  
.firefly-light-color-3 { color: var(--firefly-light-3); }  
.firefly-light-color-4 { color: var(--firefly-light-4); }  
.firefly-light-color-5 { color: var(--firefly-light-5); }  
.firefly-light-color-6 { color: var(--firefly-light-6); }  
.firefly-light-color-7 { color: var(--firefly-light-7); }  
.firefly-light-color-8 { color: var(--firefly-light-8); }  
.firefly-light-color-9 { color: var(--firefly-light-9); }  
.firefly-light-color-10 { color: var(--firefly-light-10); }  
.firefly-light-color-11 { color: var(--firefly-light-11); }  
.firefly-light-color-12 { color: var(--firefly-light-12); }  
.firefly-light-color-13 { color: var(--firefly-light-13); }  
.firefly-light-color-14 { color: var(--firefly-light-14); }  
.firefly-light-color-15 { color: var(--firefly-light-15); }  
.firefly-light-color-16 { color: var(--firefly-light-16); }  
.firefly-light-color-17 { color: var(--firefly-light-17); }  
.firefly-light-color-18 { color: var(--firefly-light-18); }  
.firefly-light-color-19 { color: var(--firefly-light-19); }  
.firefly-light-color-20 { color: var(--firefly-light-20); }
```

```

.firefly-light-color-neutral { color: var(--firefly-light-neutral); }

/* High Contrast Colors */
.firefly-contrast-color-1 { color: var(--firefly-contrast-1); }
.firefly-contrast-color-2 { color: var(--firefly-contrast-2); }
.firefly-contrast-color-3 { color: var(--firefly-contrast-3); }
.firefly-contrast-color-4 { color: var(--firefly-contrast-4); }
.firefly-contrast-color-5 { color: var(--firefly-contrast-5); }
.firefly-contrast-color-6 { color: var(--firefly-contrast-6); }
.firefly-contrast-color-7 { color: var(--firefly-contrast-7); }
.firefly-contrast-color-8 { color: var(--firefly-contrast-8); }
.firefly-contrast-color-9 { color: var(--firefly-contrast-9); }
.firefly-contrast-color-10 { color: var(--firefly-contrast-10); }
.firefly-contrast-color-11 { color: var(--firefly-contrast-11); }
.firefly-contrast-color-12 { color: var(--firefly-contrast-12); }
.firefly-contrast-color-13 { color: var(--firefly-contrast-13); }
.firefly-contrast-color-14 { color: var(--firefly-contrast-14); }
.firefly-contrast-color-15 { color: var(--firefly-contrast-15); }
.firefly-contrast-color-16 { color: var(--firefly-contrast-16); }
.firefly-contrast-color-17 { color: var(--firefly-contrast-17); }
.firefly-contrast-color-18 { color: var(--firefly-contrast-18); }
.firefly-contrast-color-19 { color: var(--firefly-contrast-19); }
.firefly-contrast-color-20 { color: var(--firefly-contrast-20); }
.firefly-contrast-color-neutral { color: var(--firefly-contrast-neutral); }

/* ===== PERFORMANCE OPTIMIZATIONS ===== */
.firefly-point, .firefly-polygon,
.firefly-light-point, .firefly-light-polygon {
  transform: translateZ(0);
  will-change: transform;
}

/* ===== ACCESSIBILITY ===== */
@media (prefers-reduced-motion: reduce) {
  .firefly-point-shimmer,
  .firefly-light-point-shimmer {
    animation: none;
  }

  .firefly-point, .firefly-polygon,
  .firefly-light-point, .firefly-light-polygon {
    transition: none;
  }
}

```



```
@media (prefers-contrast: high) {
  .firefly-point, .firefly-polygon,
  .firefly-light-point, .firefly-light-polygon {
    filter: contrast(1.5) brightness(1.2);
  }
}

/* Responsive optimizations */
@media (max-width: 768px) {
  .firefly-point-shimmer,
  .firefly-light-point-shimmer {
    animation: none;
  }
}

/* Auto mode detection */
@media (prefers-color-scheme: light) {
  .firefly-auto-point {
    /* Extend with light mode classes as default */
  }
}

@media (prefers-color-scheme: dark) {
  .firefly-auto-point {
    /* Extend with dark mode classes as default */
  }
}
```

Troubleshooting

Common Issues

Glow effects not visible

Dark Mode Symptoms: Points appear as solid circles without glow **Solutions:**

- Ensure dark background (#1a1a1a or darker)
- Verify color class is applied: `firefly-color-X`
- Check CSS custom properties are defined in `:root`

Light Mode Symptoms: Points appear washed out or invisible **Solutions:**

- Ensure light background (#d0d0d0 or lighter)
- Use appropriate color palette: `firefly-light-color-X` or `firefly-contrast-color-X`
- Check shadow effects are rendering properly

Poor performance with many elements

Symptoms: Laggy scrolling, high CPU usage **Solutions:**

- Limit shimmer animations to <50 elements
- Light mode: Limit total elements to <100 for complex effects
- Implement viewport culling
- Use `transform: translateZ(0)` for hardware acceleration
- Consider canvas rendering for >1000 points

Colors appear wrong or inconsistent

Symptoms: Colors don't match expected Firefly palette **Solutions:**

- Verify CSS custom properties are properly defined
- Check for CSS specificity conflicts
- Ensure `currentColor` is being used correctly
- Test in different browsers for color profile differences
- Verify correct mode (dark vs light) for background

Light mode visibility issues

Symptoms: Light mode symbols barely visible on light backgrounds **Solutions:**

- Use high contrast colors for very light backgrounds (#f8f8f8+)
- Switch to enhanced visibility classes
- Ensure background is actually light enough for light mode
- Test contrast ratios with accessibility tools

Mode Selection Troubleshooting

Problem: Unsure which mode to use **Solution:**

1. Measure background luminance
2. If background RGB average > 128, use light mode
3. If background RGB average < 128, use dark mode
4. For backgrounds between #666666-#999999, test both modes

Problem: Colors look different between modes **Solution:** This is expected - light mode uses darker, more saturated colors to maintain visibility contrast

Browser Compatibility

Feature	Chrome	Firefox	Safari	Edge
CSS Custom Properties	49+	31+	9.1+	16+
Box Shadow Multiple	10+	4+	5.1+	12+
Radial Gradients	26+	16+	7+	12+
CSS Animations	43+	16+	9+	12+
CSS Containment	52+	69+	15.4+	79+

Debugging Tools

```
/* Debug helper classes */
```

```
.firefly-debug {  
  outline: 1px solid red !important;  
  outline-offset: 2px;  
}
```

```
.firefly-debug::after {  
  content: attr(class);  
  position: absolute;  
  top: -20px;  
  left: 0;  
  font-size: 10px;  
  color: yellow;  
  background: rgba(0,0,0,0.8);  
  padding: 2px 4px;  
  white-space: nowrap;  
}
```

```
/* Light mode debug */
```

```
.firefly-light-debug {  
  outline: 1px solid blue !important;  
  outline-offset: 2px;  
}
```

```
.firefly-light-debug::after {  
  content: attr(class);  
  position: absolute;  
  top: -20px;  
  left: 0;
```

```
font-size: 10px;
color: black;
background: rgba(255,255,255,0.9);
padding: 2px 4px;
white-space: nowrap;
}
```

Performance Testing

```
/* Test performance with simpler effects */
.firefly-performance-test {
  /* Minimal shadow version for testing */
  box-shadow: 0 0 5px currentColor;
}

/* Monitor frame rate with this class */
.firefly-fps-test {
  animation: firefly-fps-counter 1s linear infinite;
}

@keyframes firefly-fps-counter {
  0% { opacity: 1; }
  100% { opacity: 0.9; }
}
```

License & Credits

This implementation is inspired by Esri's original Firefly style for ArcGIS Pro. Created as an open-source CSS recreation for use with any mapping library, now with comprehensive light mode support.

Version: 2.0

Last Updated: August 2025

Compatibility: Modern browsers supporting CSS custom properties

New in v2.0: Complete light mode implementation with 3 color palette variants

Features Added in Version 2.0

- **Light Mode Support:** Complete adaptation for light backgrounds
- **60 Total Colors:** 20 original + 20 light mode + 20 high contrast variants
- **Enhanced Performance:** Optimized rendering for both modes

- **Auto Mode Detection:** CSS media queries for automatic theme switching
- **Expanded Integration:** Light mode examples for all major mapping libraries
- **Accessibility Improvements:** Better contrast ratios and motion sensitivity

Attribution

- Original Firefly style concept: Esri ArcGIS Pro team
- CSS recreation: Open source community
- Light mode adaptation: Extended implementation for broader accessibility

Usage License

This CSS implementation is provided under MIT license for:

- Commercial and non-commercial projects
- Web mapping applications
- Educational and research purposes
- Open source and proprietary software

Contributing

For questions, bug reports, improvements, or contributions:

- Report issues with specific browser/mapping library combinations
- Suggest color palette improvements for accessibility
- Provide performance optimization feedback
- Share integration examples with other mapping libraries

Implementation Notes

Dark Mode (Original Firefly):

- Optimized for backgrounds darker than #333333
- Uses bright, saturated colors with outer glow effects
- Lower performance overhead
- Best for traditional dark mapping interfaces

Light Mode (New Implementation):

- Optimized for backgrounds lighter than #d0d0d0
- Uses darker, more saturated colors with drop shadows
- Higher performance overhead due to complex shadow rendering
- Perfect for light-themed applications and high-contrast accessibility

High Contrast Mode:

- Optimized for very light backgrounds (#f8f8f8+)
- Uses the darkest color variants for maximum visibility
- Essential for accessibility compliance
- Recommended for white or near-white map backgrounds

Technical Specifications

Browser Support:

- Chrome 49+, Firefox 31+, Safari 9.1+, Edge 16+
- Requires CSS custom properties and multiple box shadows
- Hardware acceleration recommended for optimal performance

Performance Recommendations:

- Dark Mode: <200 animated elements on desktop, <50 on mobile
- Light Mode: <100 animated elements on desktop, <25 on mobile
- Use viewport culling for datasets with >500 elements
- Consider canvas rendering for >1000 static elements

Accessibility Features:

- Color-blind friendly alternatives for all 20 base colors
- Respects user motion preferences (prefers-reduced-motion)
- High contrast mode support for Windows accessibility
- WCAG AA compliant when using appropriate color combinations

Future Development

Planned Features:

- SVG-based symbol variants for better scalability
- Additional animation patterns (pulse, fade, rotate)
- CSS Grid and Container Query optimizations
- Web Components implementation for easier integration

Community Contributions Welcome:

- Additional mapping library integration examples
- Performance optimizations for specific use cases
- Alternative color palettes for specialized applications
- Accessibility enhancements and testing

For technical support, updates, or to contribute to this project, please visit the project repository or documentation site.

Appendix: Quick Reference

Class Naming Convention

Dark Mode (Original):

- Points: `.firefly-point` `.firefly-point-{style}` `.firefly-point-{size}`
`.firefly-color-{number}`
- Polygons: `.firefly-polygon` `.firefly-polygon-{style}`
`.firefly-color-{number}`
- Lines: `.firefly-line` `.firefly-color-{number}` or `.firefly-line-dashed`
`.firefly-color-{number}`

Light Mode:

- Points: `.firefly-light-point` `.firefly-light-point-{style}`
`.firefly-light-point-{size}` `.firefly-light-color-{number}`
- Polygons: `.firefly-light-polygon` `.firefly-light-polygon-{style}`
`.firefly-light-color-{number}`
- Lines: `.firefly-light-line` `.firefly-light-color-{number}` or
`.firefly-light-line-dashed` `.firefly-light-color-{number}`

High Contrast:

- Use `.firefly-contrast-color-{number}` with any light mode class

Size Reference

Size Class	Dimensions	Use Case
-xs	4px × 4px	Dense data, overview maps
-sm	8px × 8px	Standard features
-md	12px × 12px	Default size
-lg	20px × 20px	Important features
-xl	32px × 32px	Major landmarks

Style Variants

Style	Dark Mode	Light Mode	Description
Standard	<code>-standard</code>	<code>-standard</code>	Basic glow effect
Enhanced	<code>-shimmer</code>	<code>-enhanced</code>	Stronger visibility
Animated	<code>-shimmer</code>	<code>-shimmer</code>	Animated effects
Inner Glow	<code>-inner</code>	<code>-inner</code>	For adjacent elements

Color Selection Guide

For Thematic Data: Use 2-6 consecutive colors (e.g., colors 8-13) **For Categories:** Use opposite colors (e.g., color 8 + color 18) **For High Contrast:** Use contrast variants on very light backgrounds **For Accessibility:** Avoid red-green combinations, test with simulators

Performance Quick Tips

- Limit animations:** <50 shimmer elements total
- Use hardware acceleration:** Add `transform: translateZ(0)`
- Implement culling:** Hide off-screen elements
- Choose mode wisely:** Light mode has higher rendering cost
- Test on mobile:** Reduce effects for smaller screens

END OF DOCUMENTATION

This comprehensive guide provides everything needed to implement Firefly-style glowing effects in both dark and light environments, with full compatibility across modern web mapping platforms.