1980 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕ 0
- • 0.01-1
- • 1.01-10
- • 10.01-100
- ● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

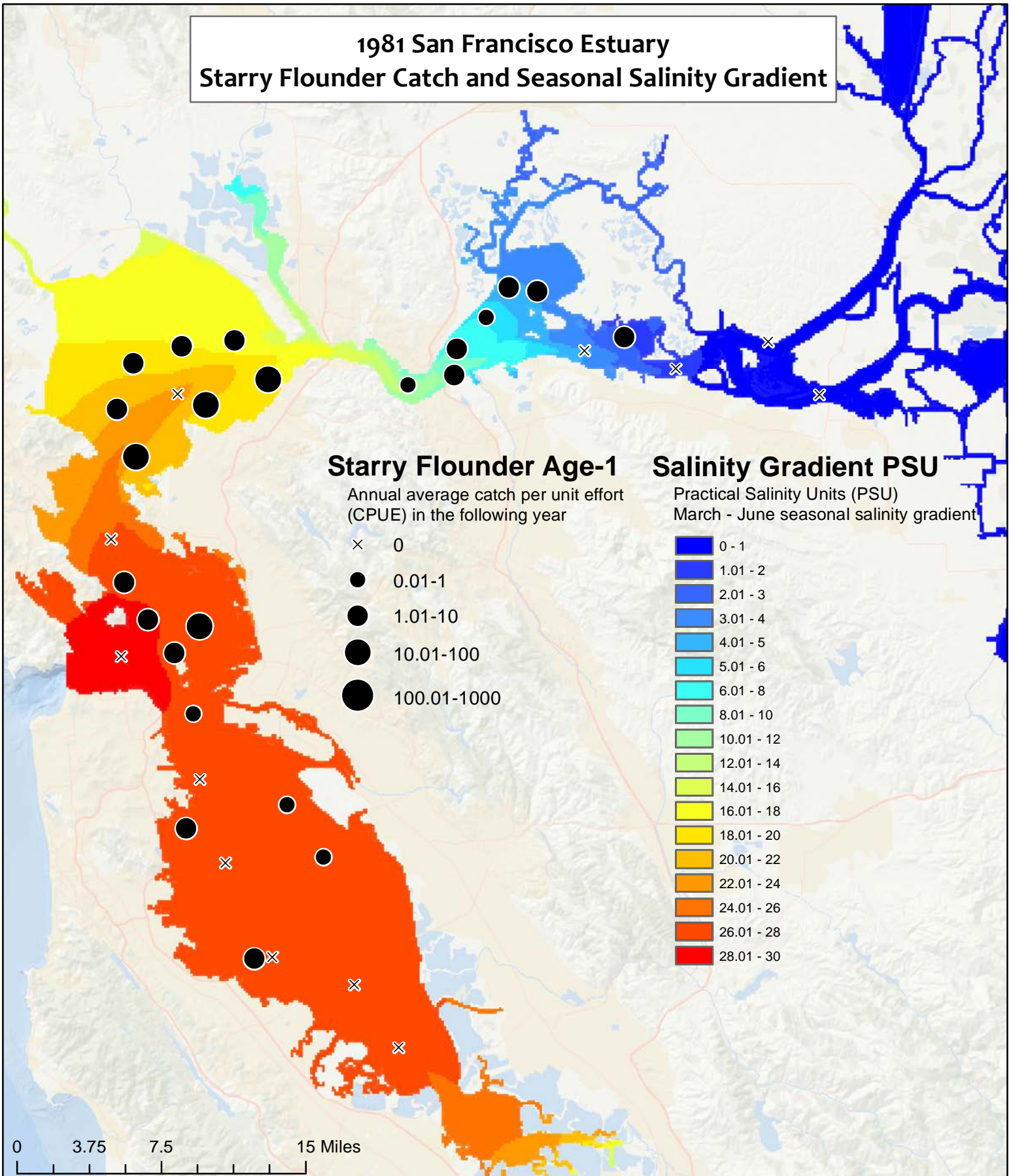0   3.75   7.5   15 Miles

About this map

The March to June seasonal salinity gradient is plotted in the SF Estuary
beneath the annual average CPUE of age-1 starry flounder for each monitoring
station in the SF Bay Study otter trawl. Salinity conditions shown are one year
prior to CPUE data consistent with the salinity-abundance relationship published
in Kimmerer (2002), Marine Ecology and Progress Series 243: 39-55.

WTR1502244.6   E. Foresman 7/13/2015

Data sources

Fish CPUE - San Francisco Bay Study CA Department of Fish and Wildlife
    and the Interagency Ecological Program
Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
    Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

1981 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

×   0

●   0.01-1

●   1.01-10

●   10.01-100

●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30
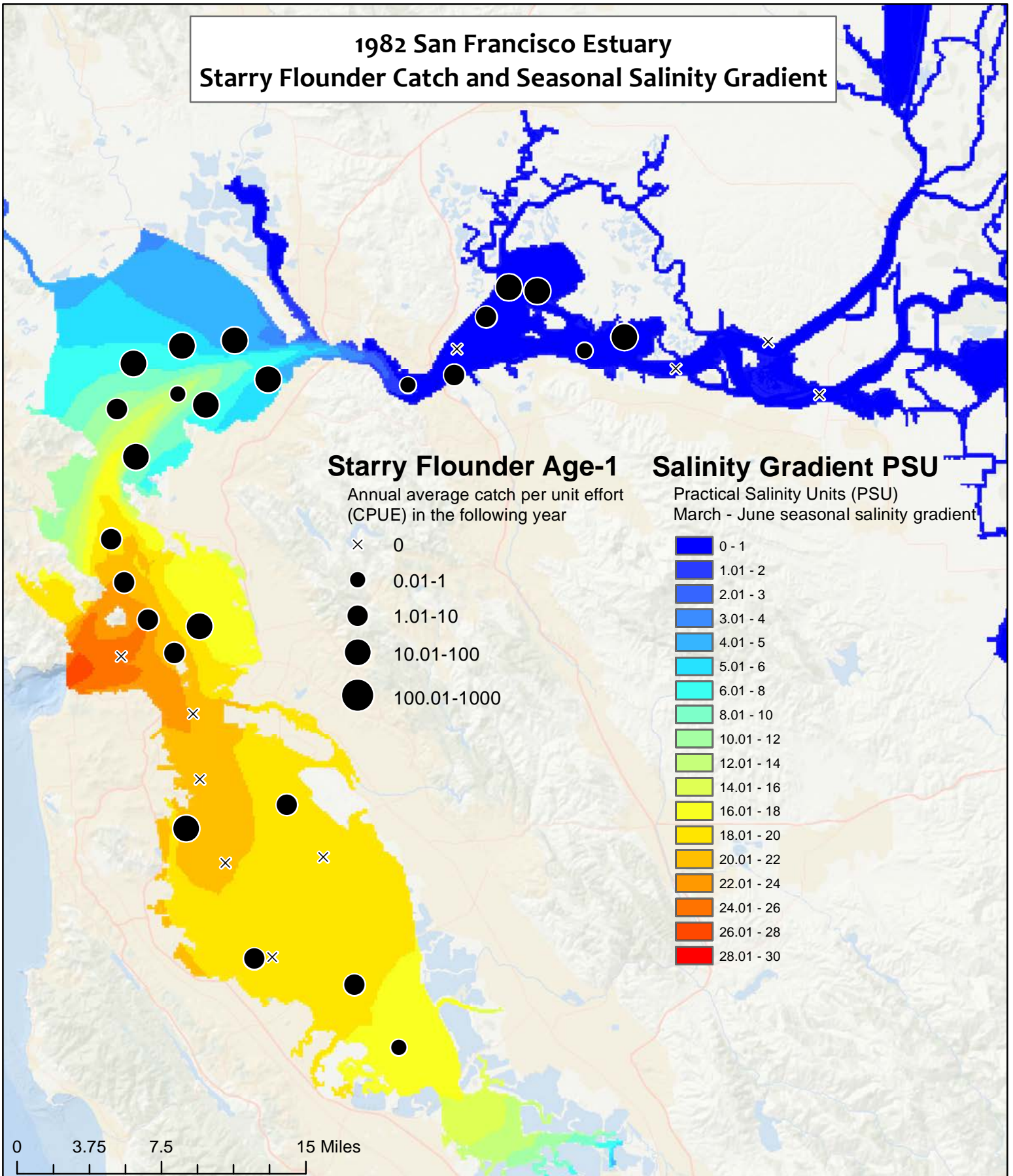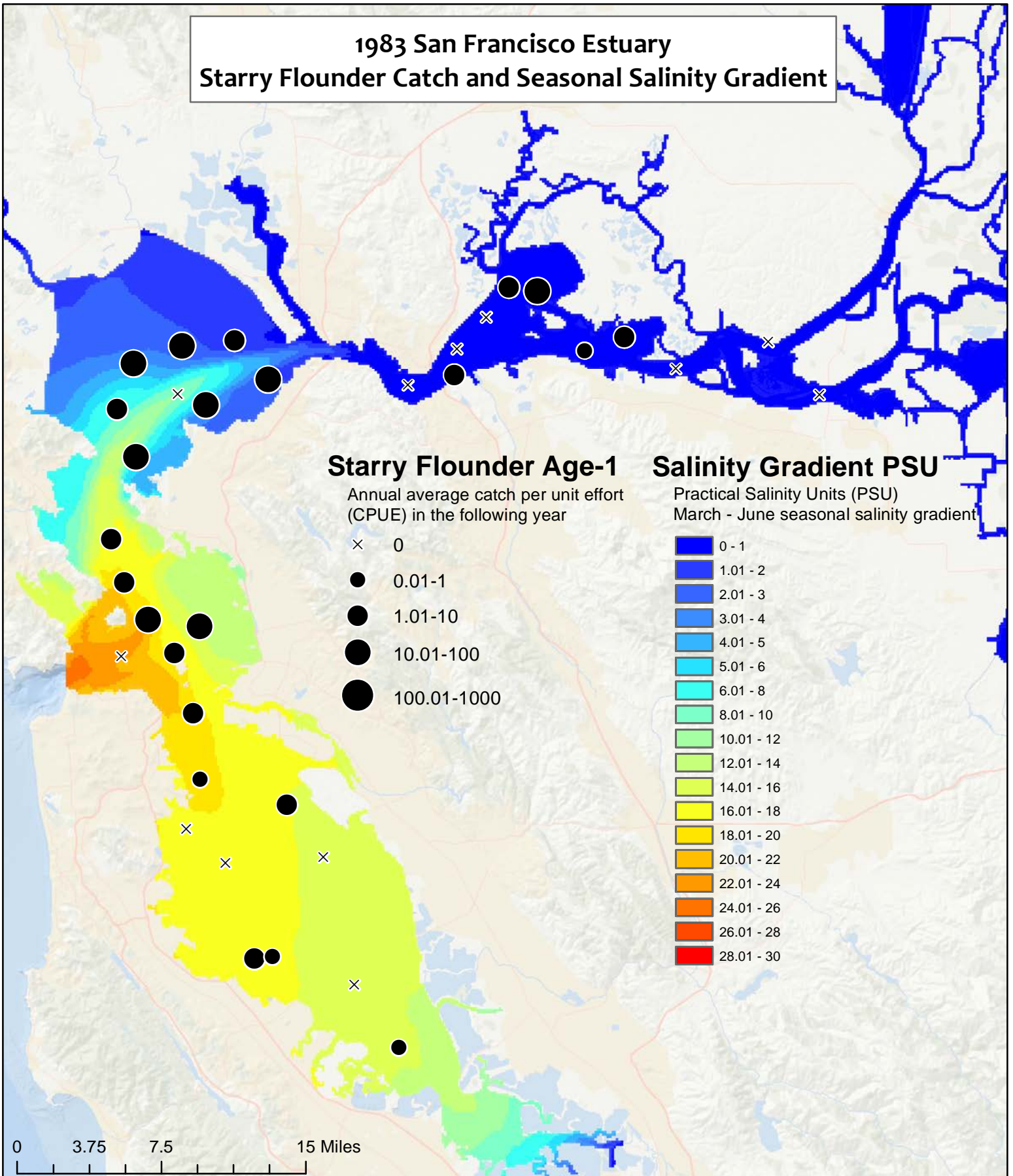
0   3.75   7.5   15 Miles

About this map

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Esri, DeLorme, GEBCO, NOAA NGDC, and other contributors

1982 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- ●   0.01-1
- ●   1.01-10
- ●   10.01-100
- ●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

0	3.75	7.5		15 Miles

About this map

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1983 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✗ 0
- • 0.01-1
- ● 1.01-10
- ● 10.01-100
- ● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

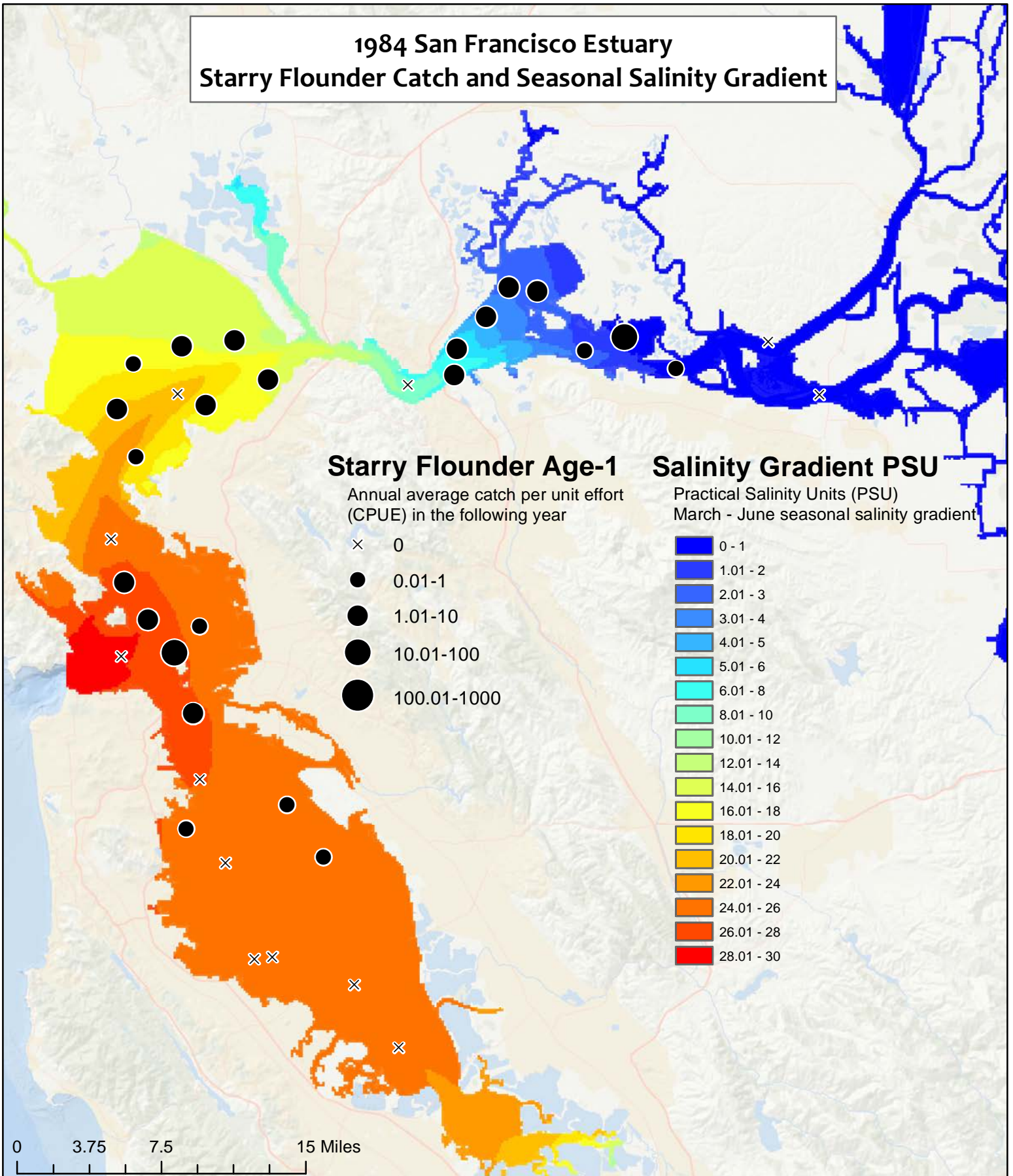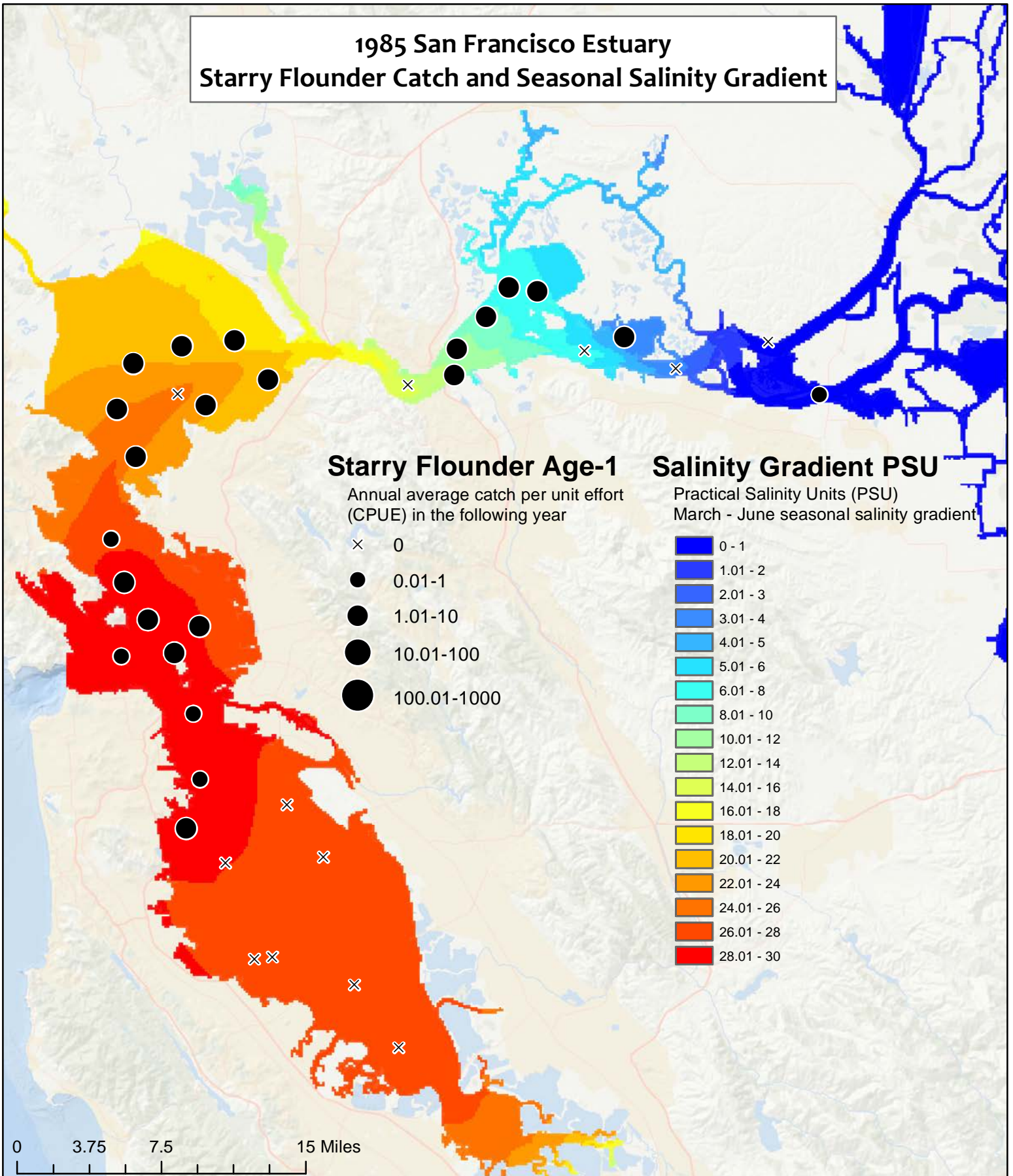0   3.75   7.5   15 Miles

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WTR1502244.6   E. Foresman 7/13/2015

Data sources

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Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

1984 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

Symbol	Value
✕	0
•	0.01-1
●	1.01-10
●	10.01-100
●	100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

	PSU
	0 - 1
	1.01 - 2
	2.01 - 3
	3.01 - 4
	4.01 - 5
	5.01 - 6
	6.01 - 8
	8.01 - 10
	10.01 - 12
	12.01 - 14
	14.01 - 16
	16.01 - 18
	18.01 - 20
	20.01 - 22
	22.01 - 24
	24.01 - 26
	26.01 - 28
	28.01 - 30

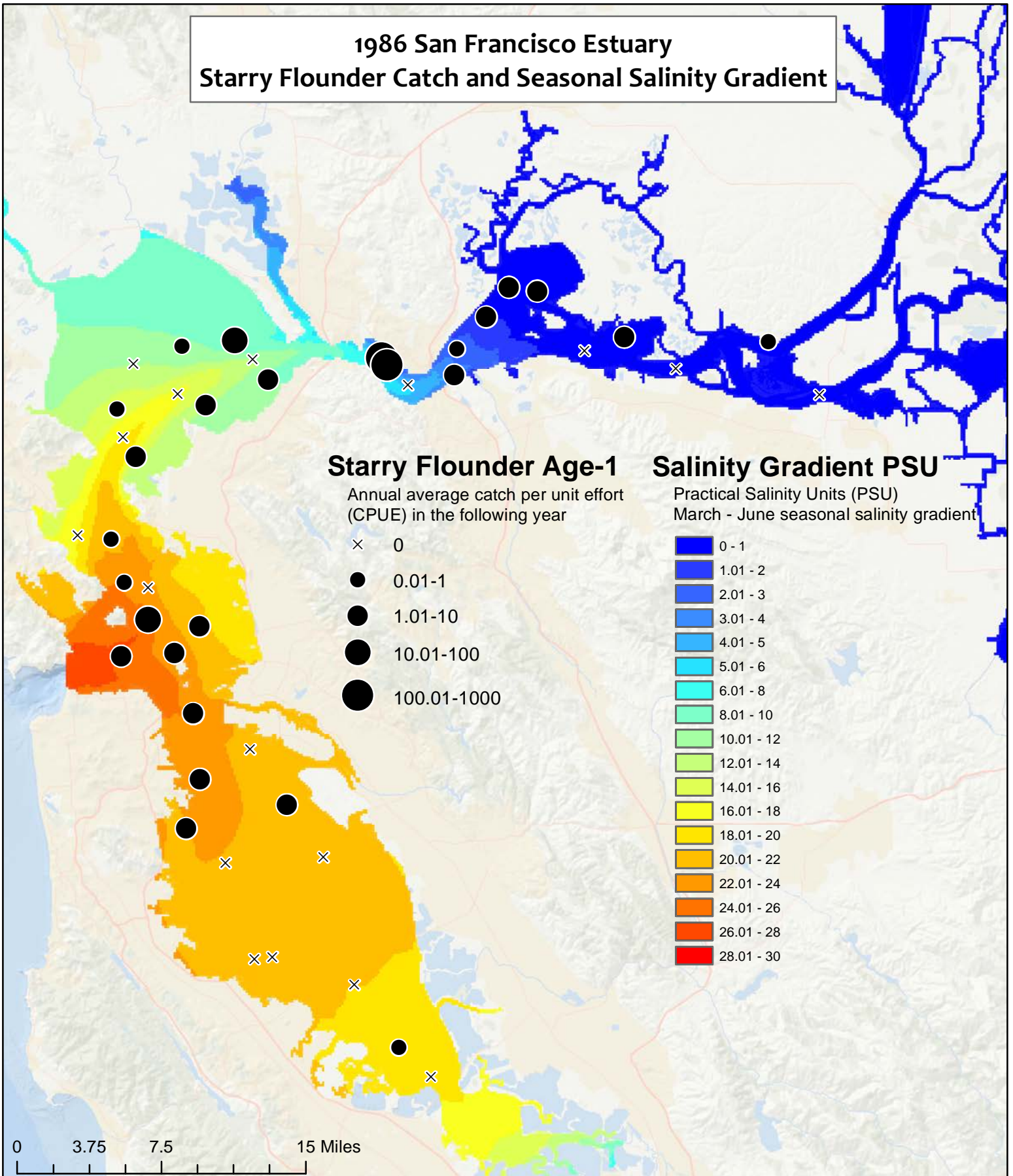| 0	3.75	7.5	15 Miles

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    and the Interagency Ecological Program
Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
    Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

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1985 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

✕	0
●	0.01-1
●	1.01-10
●	10.01-100
●	100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

	0 - 1
	1.01 - 2
	2.01 - 3
	3.01 - 4
	4.01 - 5
	5.01 - 6
	6.01 - 8
	8.01 - 10
	10.01 - 12
	12.01 - 14
	14.01 - 16
	16.01 - 18
	18.01 - 20
	20.01 - 22
	22.01 - 24
	24.01 - 26
	26.01 - 28
	28.01 - 30

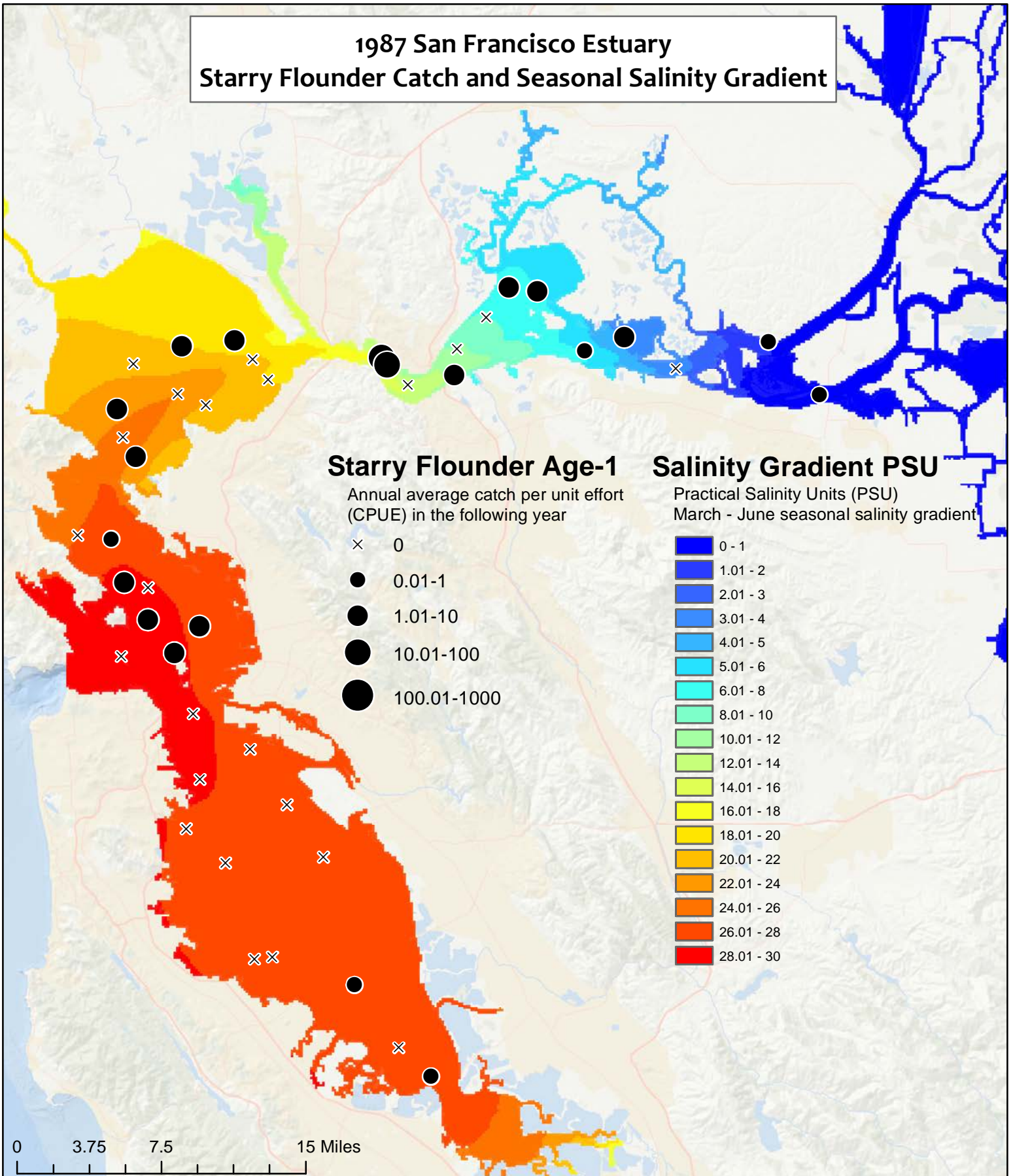0   3.75   7.5   15 Miles

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Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
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Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

1986 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- ●   0.01-1
- ●   1.01-10
- ●   10.01-100
- ●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30
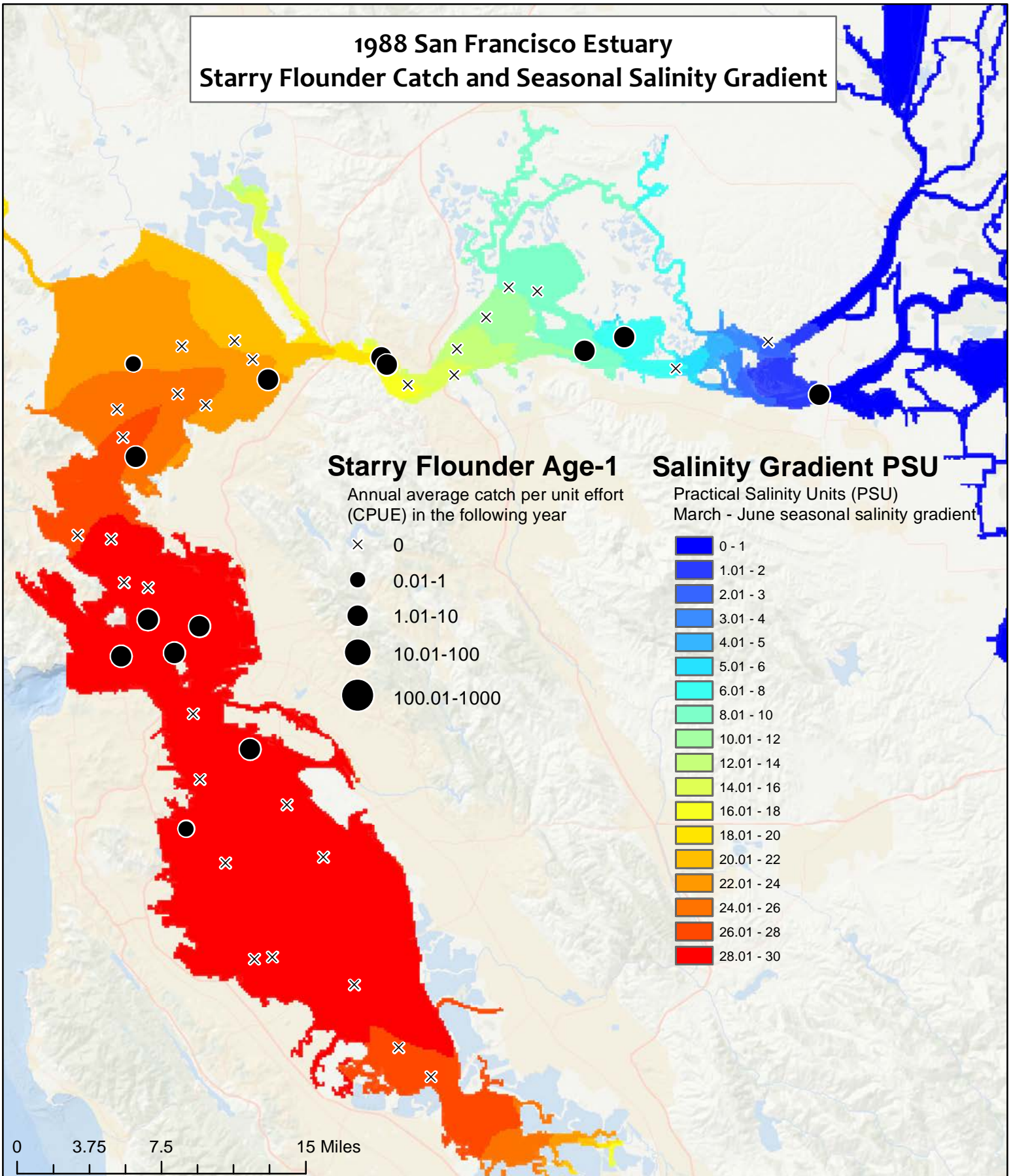
0   3.75   7.5   15 Miles

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Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

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1987 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- •   0.01-1
- •   1.01-10
- ●   10.01-100
- ●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30
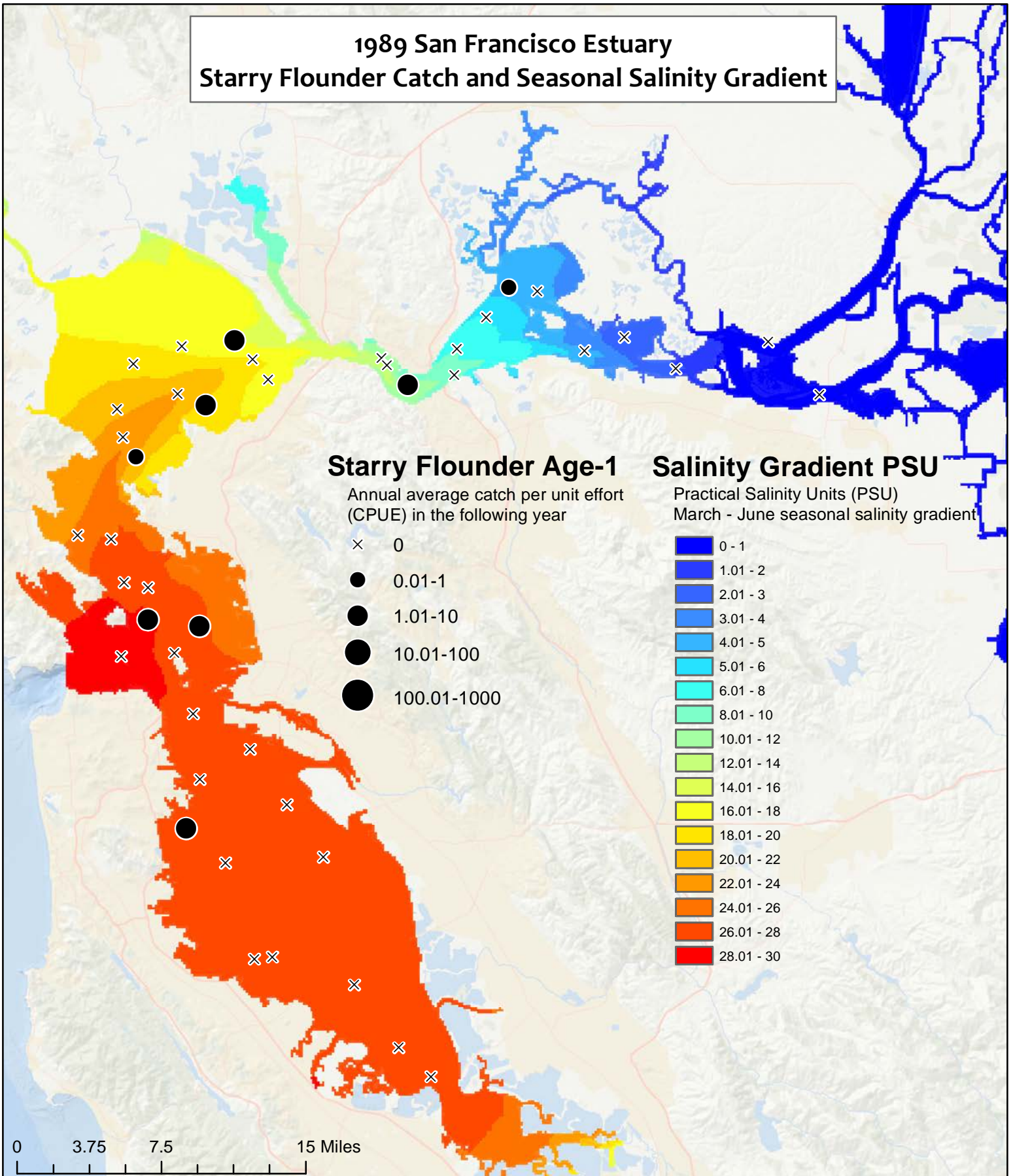
0   3.75   7.5   15 Miles

About this map

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beneath the annual average CPUE of age-1 starry flounder for each monitoring
station in the SF Bay Study otter trawl. Salinity conditions shown are one year
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WTR1502244.6   E. Foresman 7/13/2015

1988 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort (CPUE) in the following year

- ✕ 0
- • 0.01-1
- • 1.01-10
- ● 10.01-100
- ● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

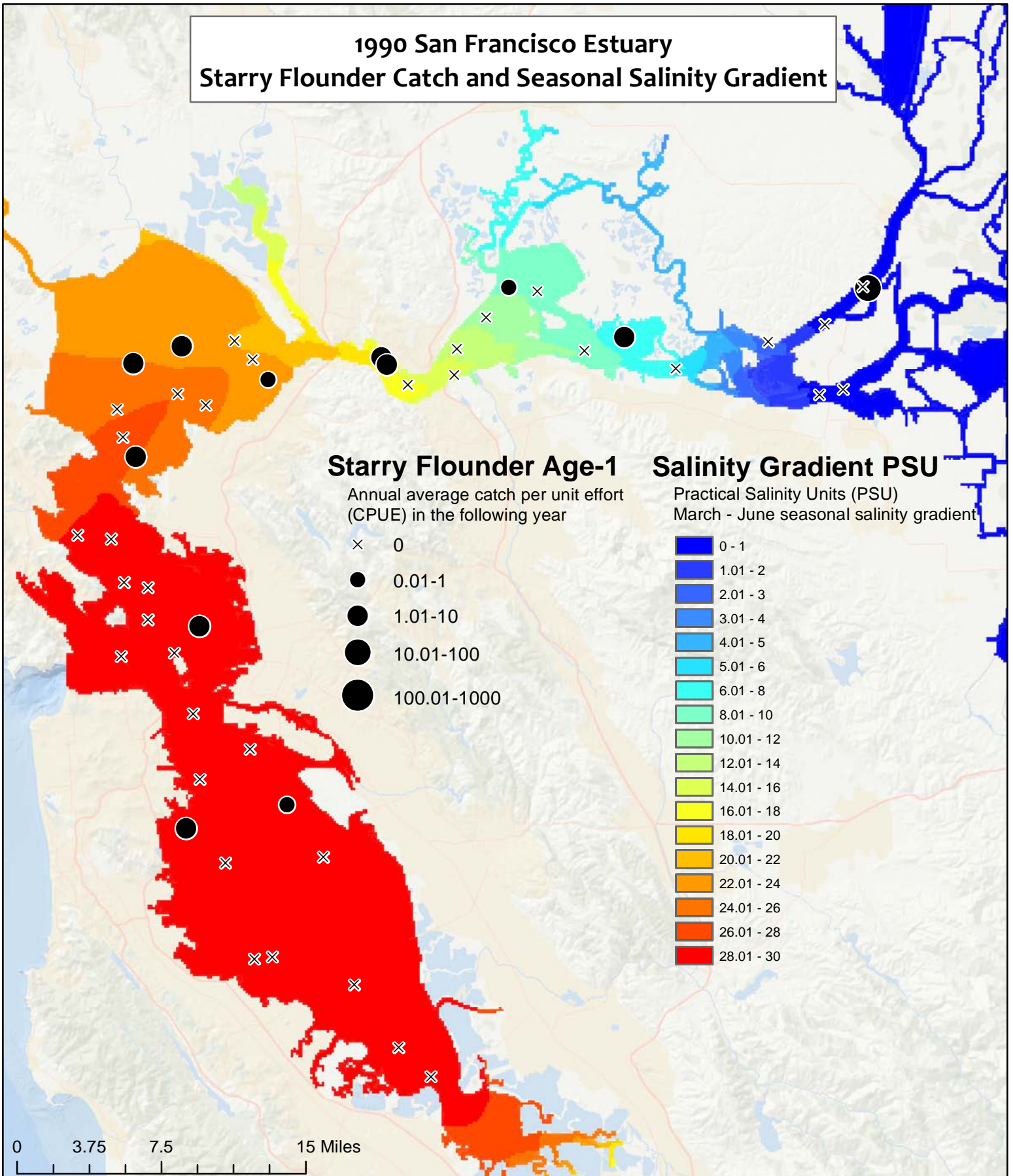0   3.75   7.5   15 Miles

About this map

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WTR1502244.6

E. Foresman 7/13/2015

1989 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

×   0

●   0.01-1

●   1.01-10

●   10.01-100

●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

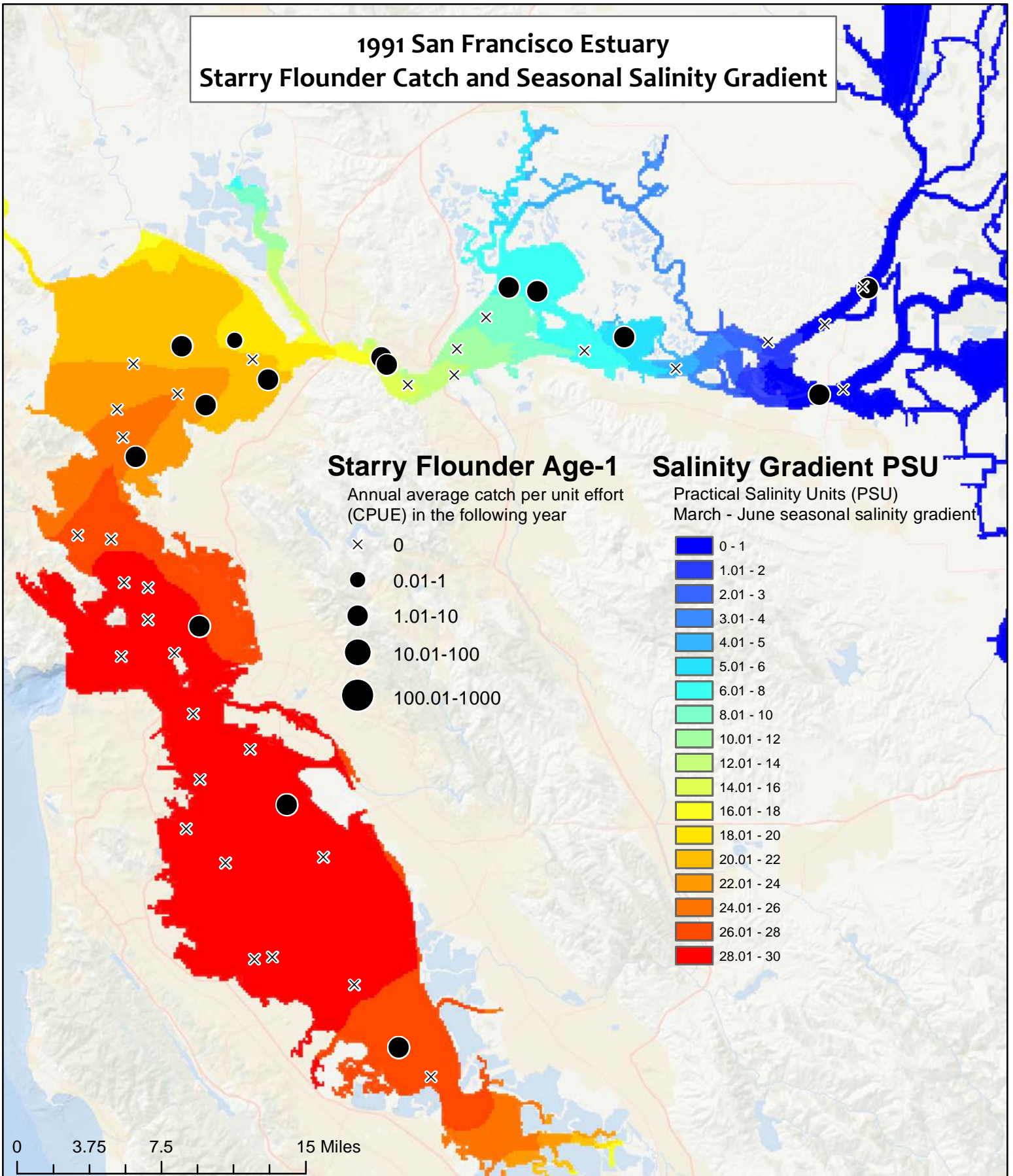| 0	3.75	7.5	15 Miles

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Data sources

Fish CPUE - San Francisco Bay Study CA Department of Fish and Wildlife
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Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

WTR1502244.6   E. Foresman 7/13/2015

1990 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

× 0

● 0.01-1

● 1.01-10

● 10.01-100

● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

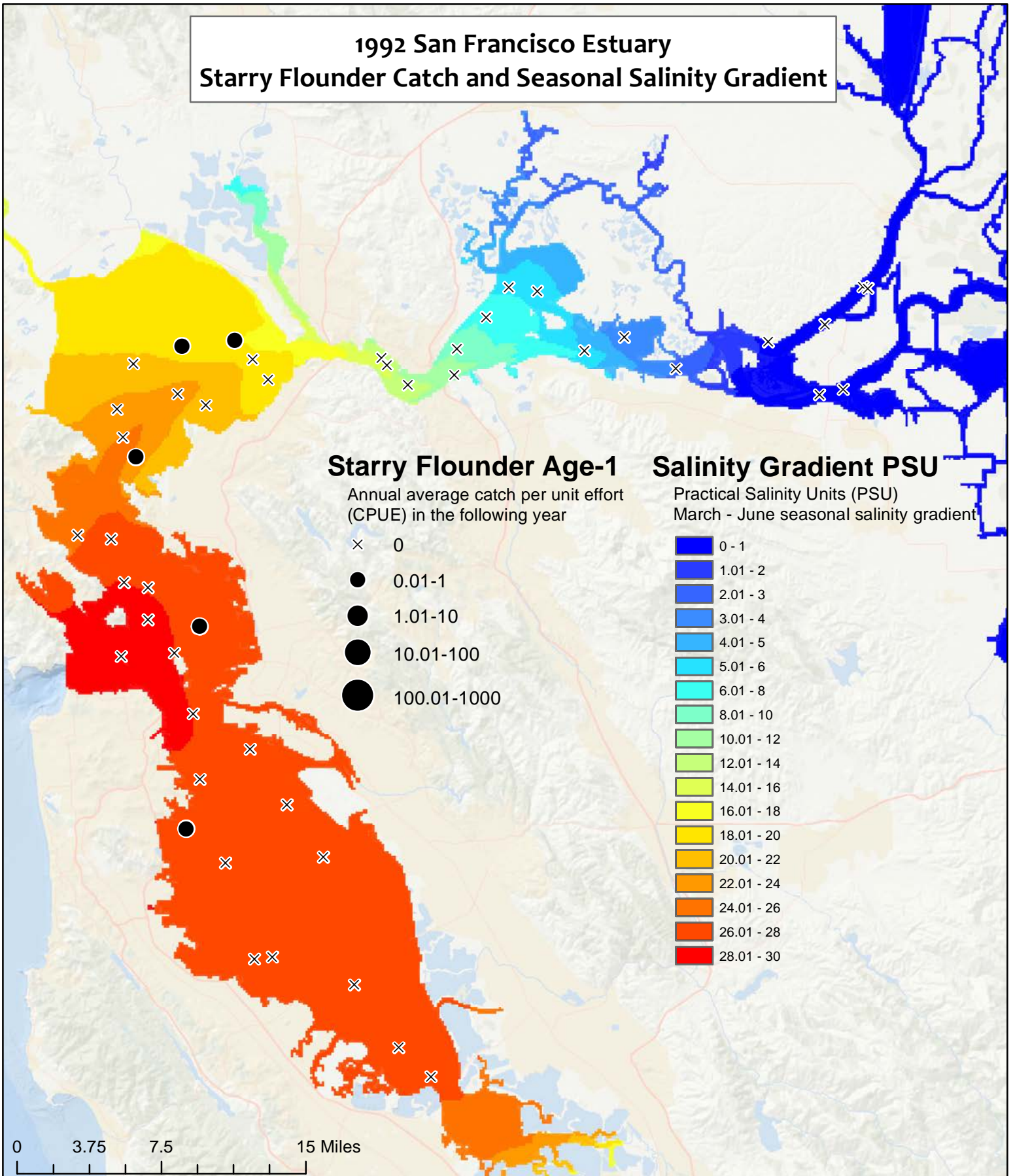0   3.75   7.5   15 Miles

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WTR1502244.6   E. Foresman 7/13/2015

1991 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕ 0
- • 0.01-1
- • 1.01-10
- ● 10.01-100
- ● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

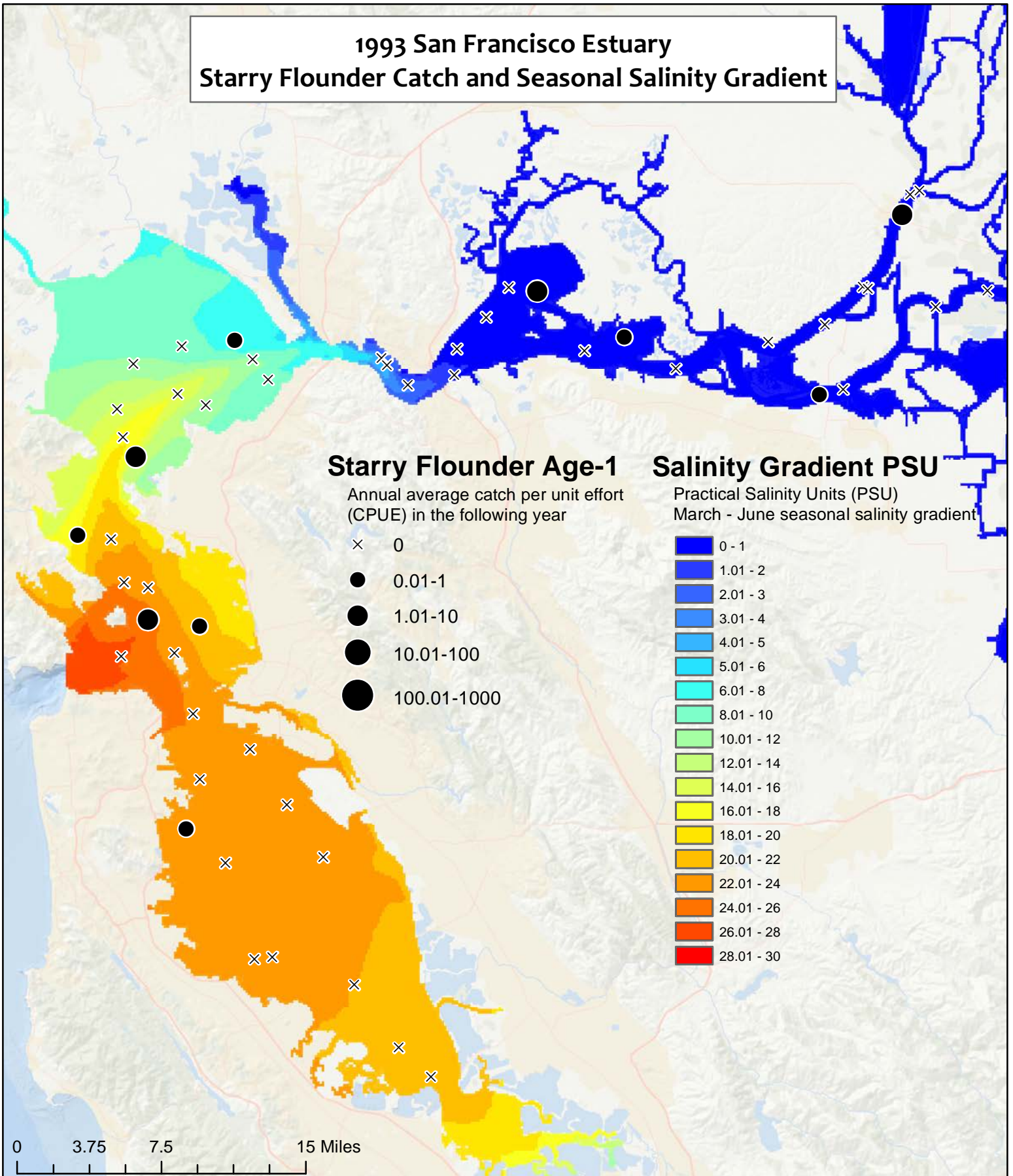0   3.75   7.5   15 Miles

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Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
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Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

WTR1502244.6   E. Foresman 7/13/2015

1992 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

× 0

● 0.01-1

● 1.01-10

● 10.01-100

● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

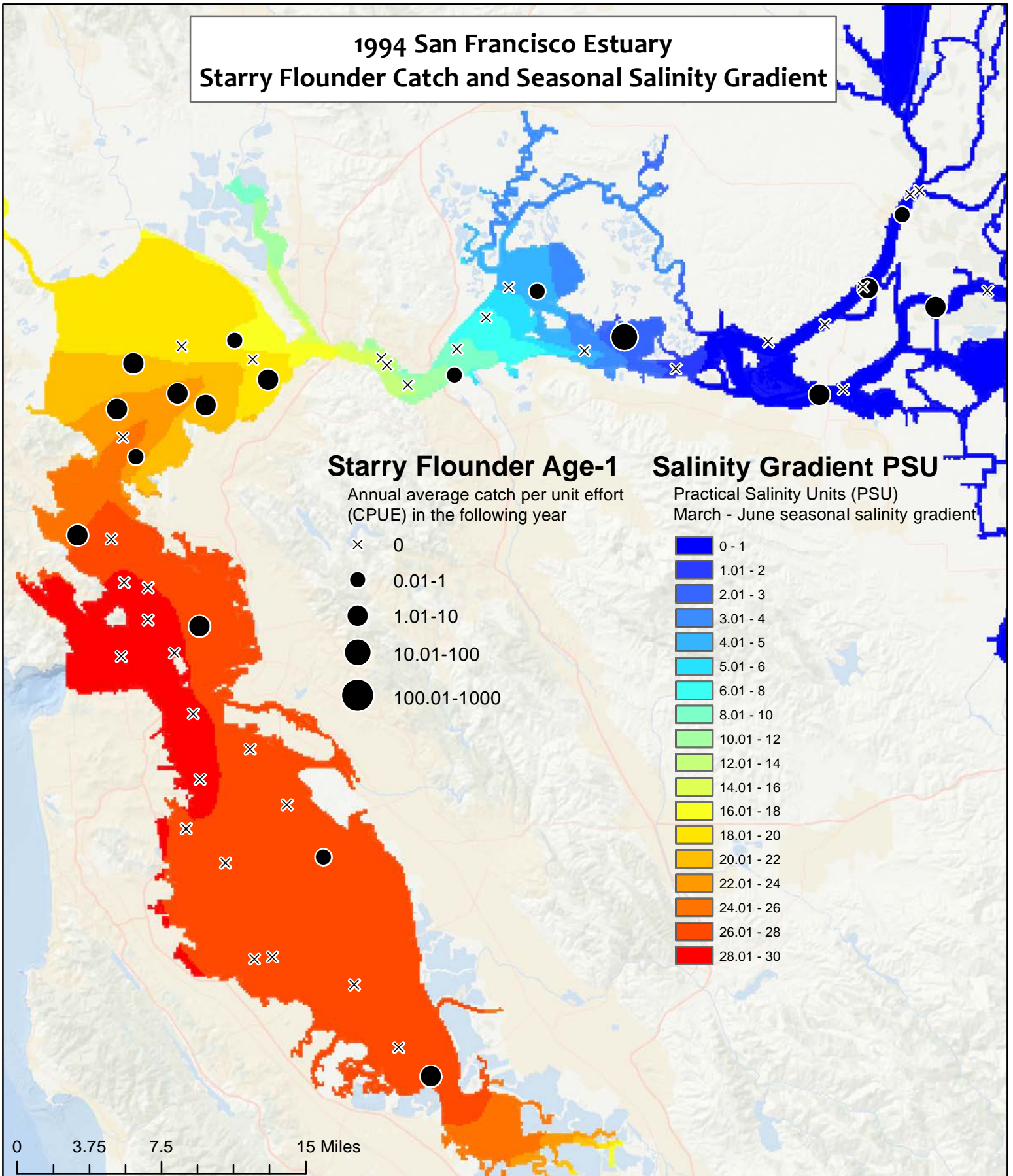0   3.75   7.5   15 Miles

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WTR1502244.6

E. Foresman 7/13/2015

1993 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- ●   0.01-1
- ●   1.01-10
- ●   10.01-100
- ●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

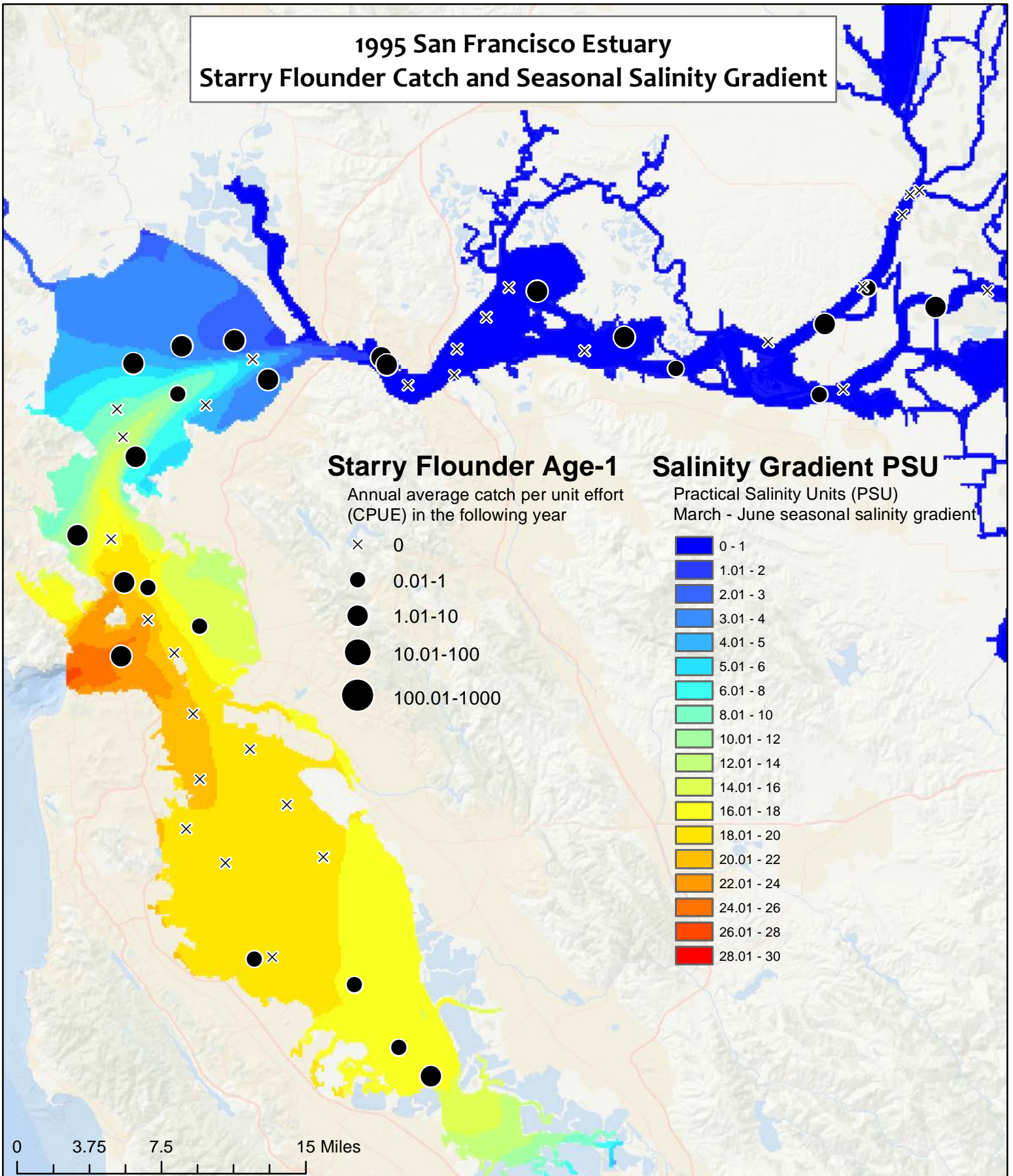| 0	3.75	7.5	15 Miles

About this map

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Data sources

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Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
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Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

WTR1502244.6   E. Foresman 7/13/2015

1994 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- •   0.01-1
- •   1.01-10
- ●   10.01-100
- ⬤   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

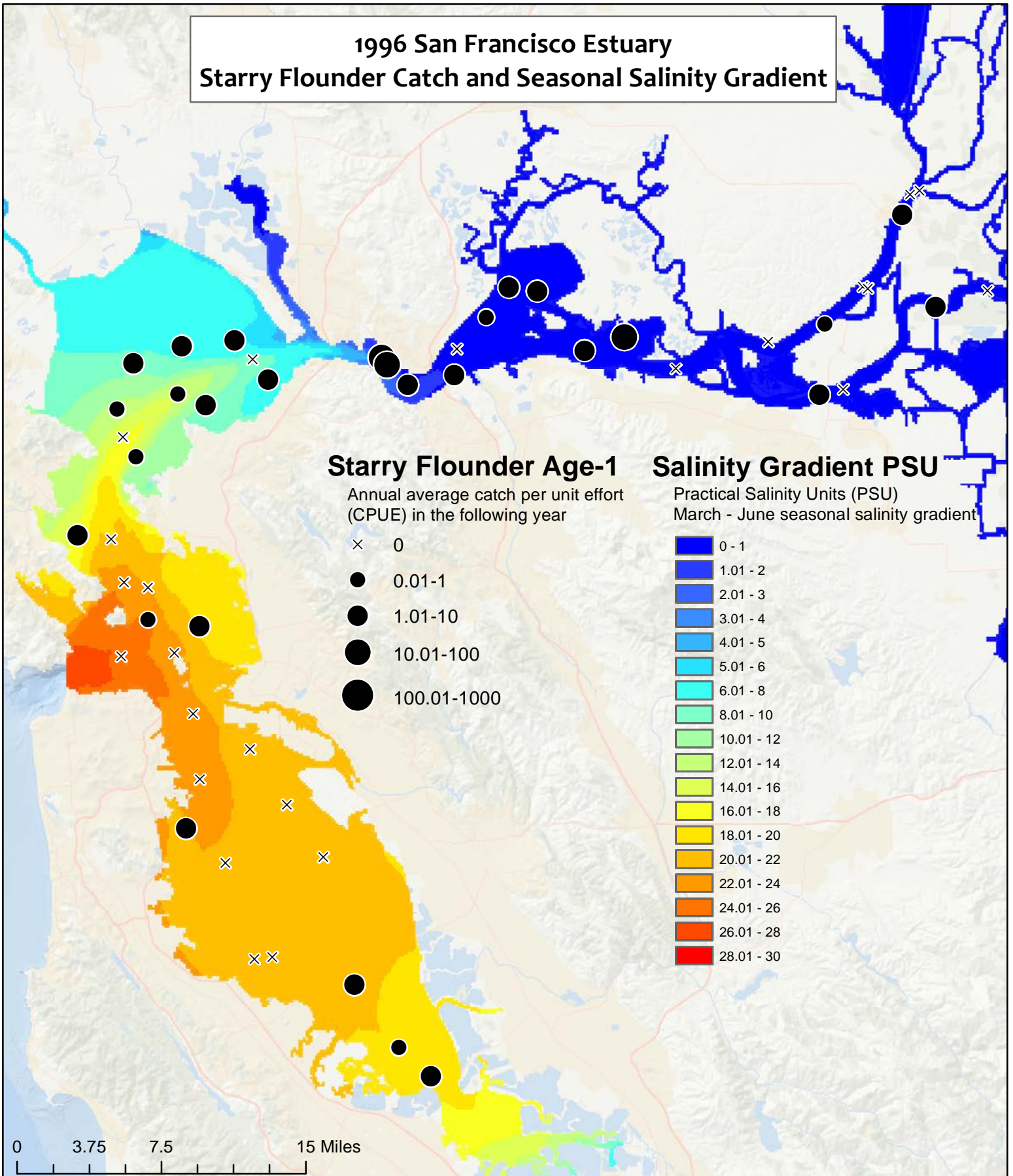| 0	3.75	7.5	15 Miles

About this map

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prior to CPUE data consistent with the salinity-abundance relationship published
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Data sources

Fish CPUE - San Francisco Bay Study CA Department of Fish and Wildlife
and the Interagency Ecological Program
Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

1995 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- × 0
- • 0.01-1
- ● 1.01-10
- ● 10.01-100
- ● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

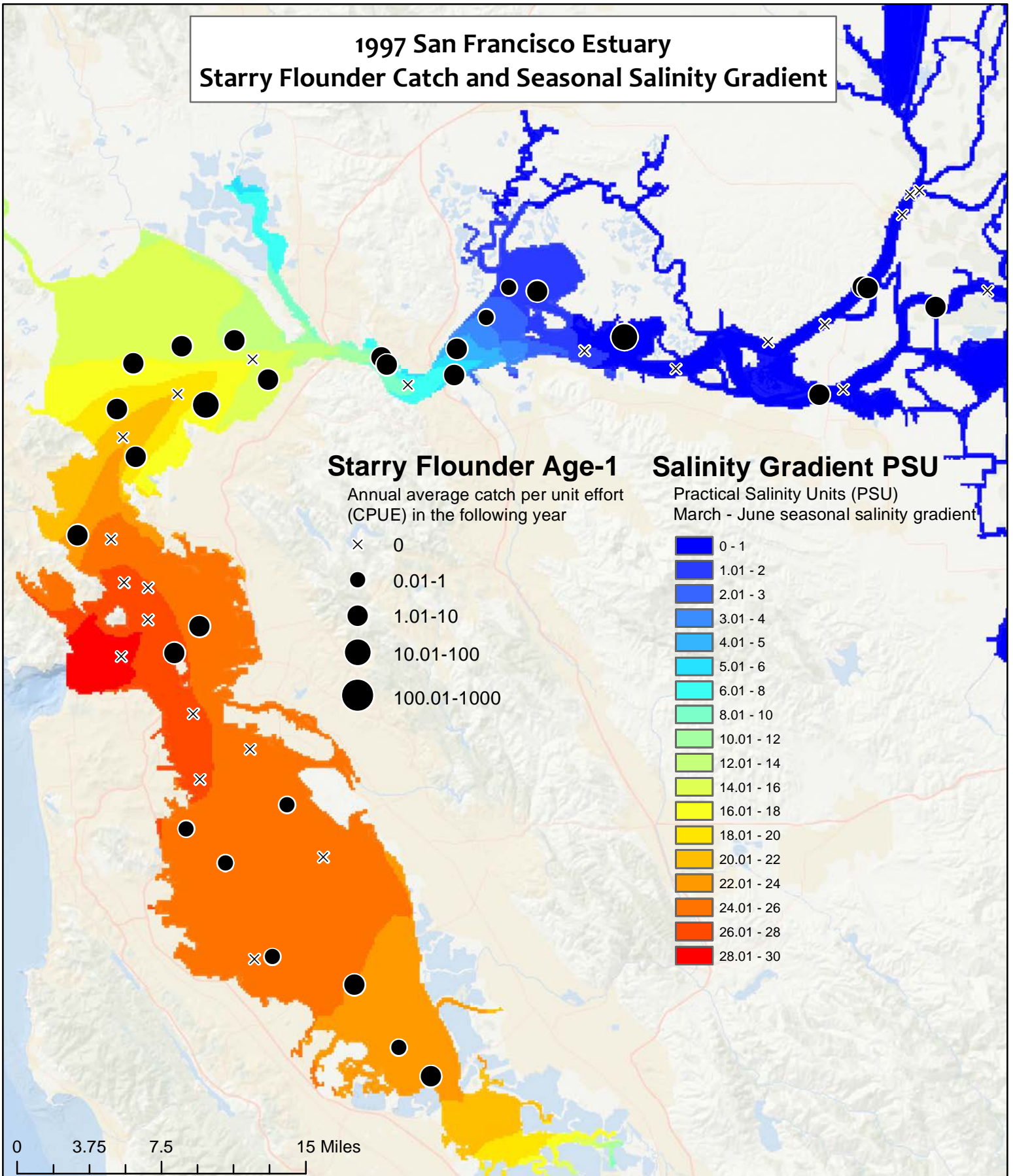0   3.75   7.5   15 Miles

About this map

The March to June seasonal salinity gradient is plotted in the SF Estuary
beneath the annual average CPUE of age-1 starry flounder for each monitoring
station in the SF Bay Study otter trawl. Salinity conditions shown are one year
prior to CPUE data consistent with the salinity-abundance relationship published
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Data sources

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  Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

1996 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✗ 0
- • 0.01-1
- ● 1.01-10
- ⬤ 10.01-100
- ⬤ 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

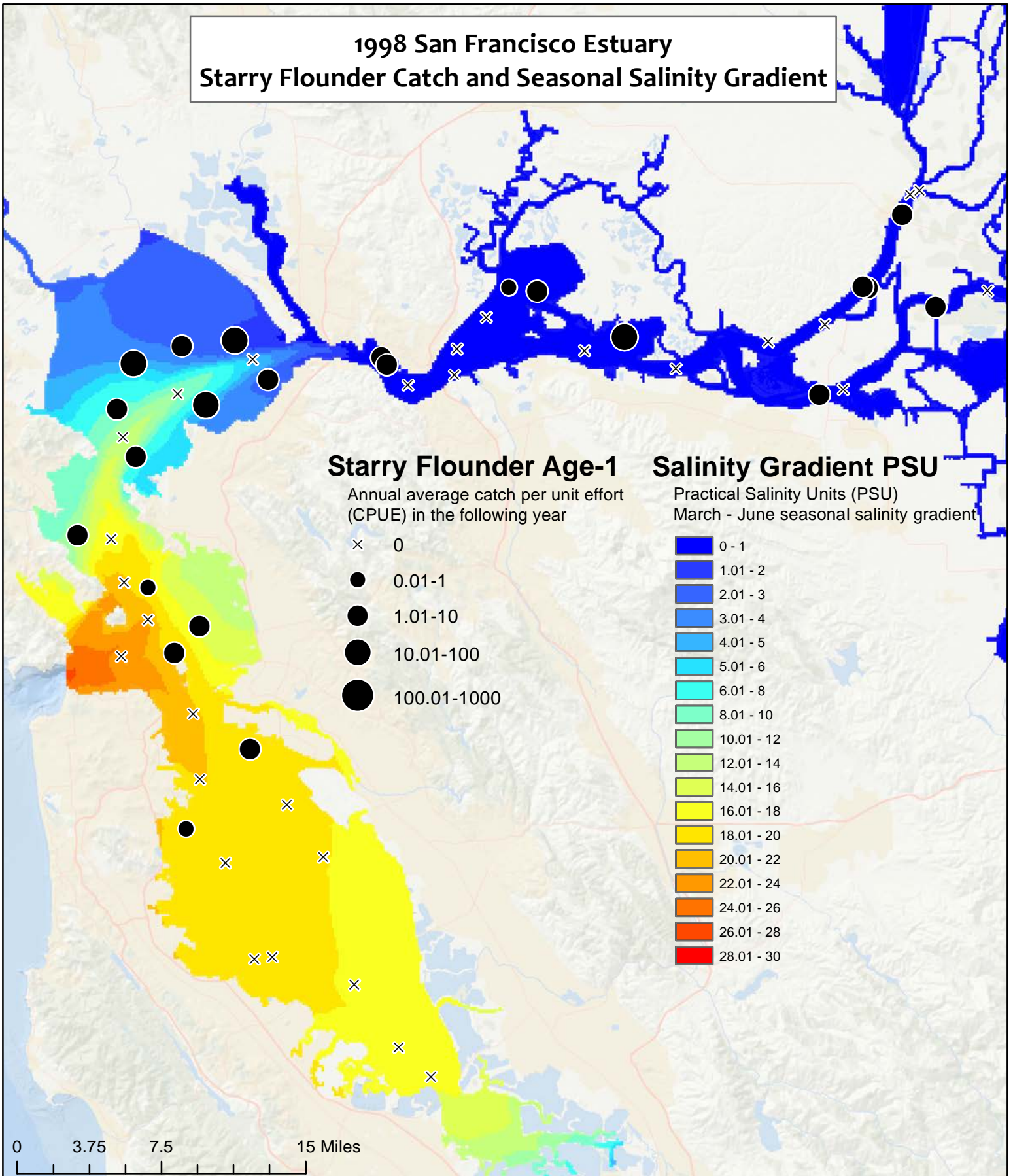0   3.75   7.5   15 Miles

About this map

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Data sources

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Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

1997 San Francisco Estuary
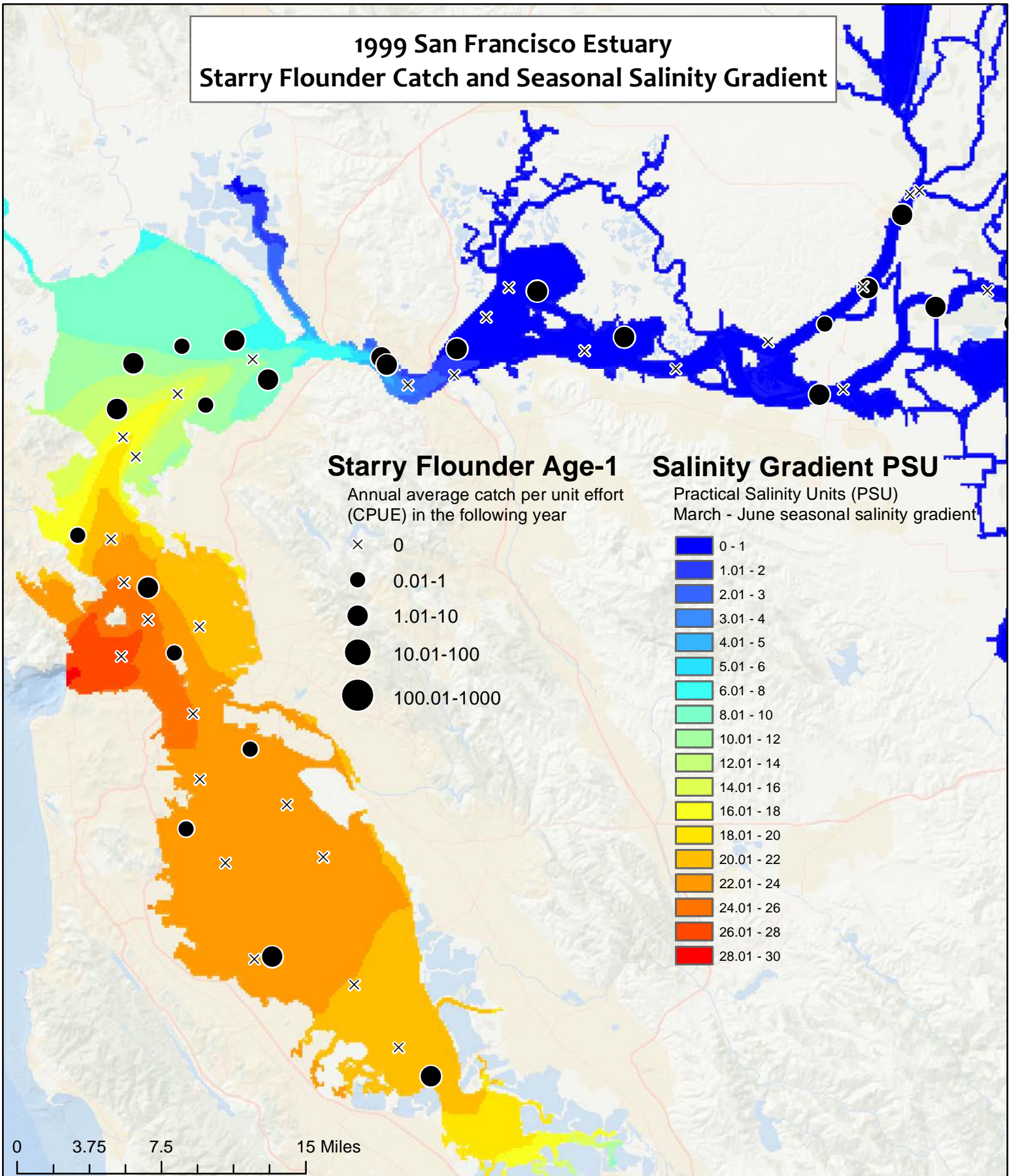# Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

×   0

•   0.01-1

●   1.01-10

●   10.01-100

●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

▉	0 - 1
▉	1.01 - 2
▉	2.01 - 3
▉	3.01 - 4
▉	4.01 - 5
▉	5.01 - 6
▉	6.01 - 8
▉	8.01 - 10
▉	10.01 - 12
▉	12.01 - 14
▉	14.01 - 16
▉	16.01 - 18
▉	18.01 - 20
▉	20.01 - 22
▉	22.01 - 24
▉	24.01 - 26
▉	26.01 - 28
▉	28.01 - 30

0   3.75   7.5   15 Miles

1998 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

×   0

●   0.01-1

●   1.01-10

●   10.01-100

●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

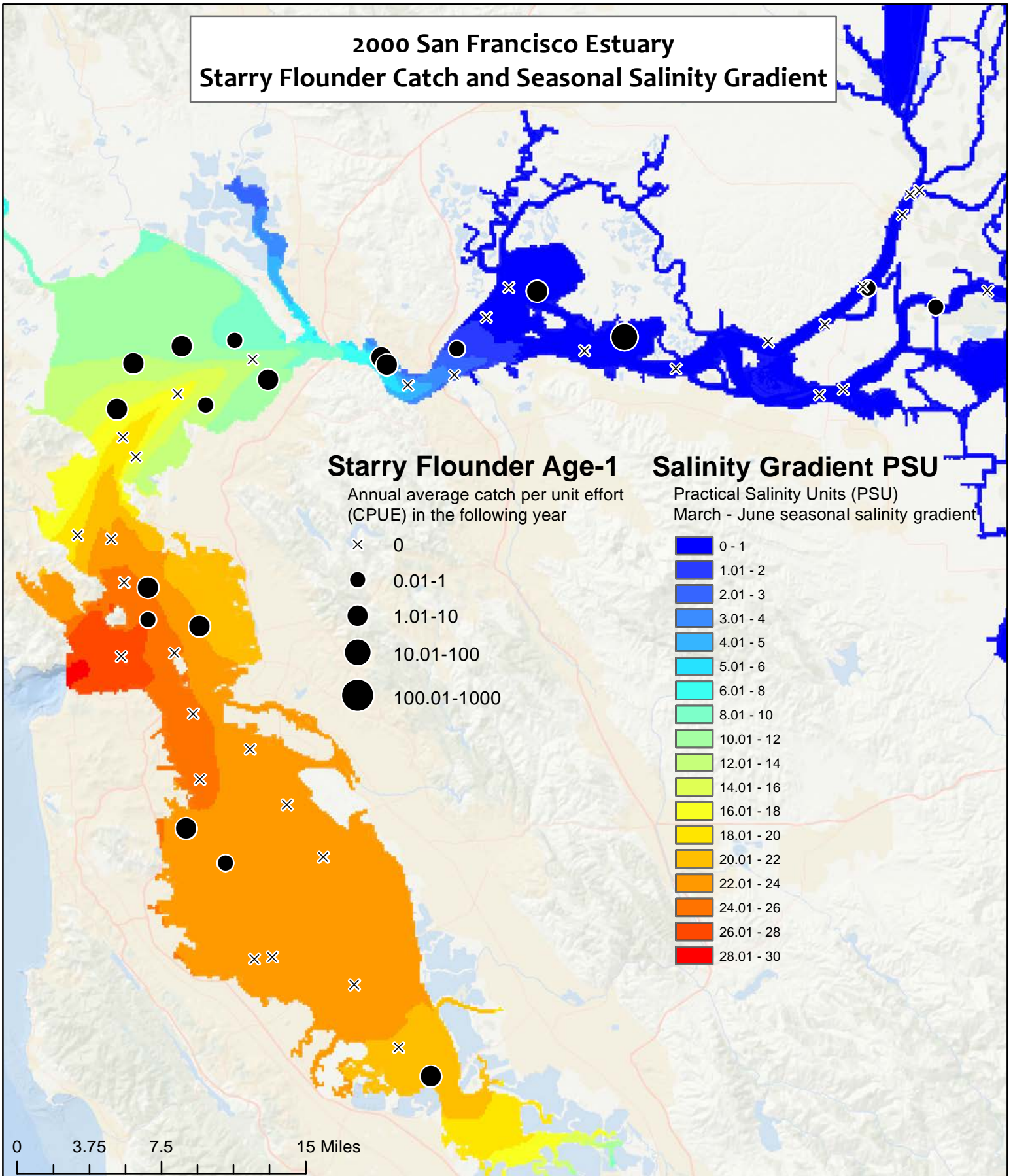0   3.75   7.5   15 Miles

About this map

The March to June seasonal salinity gradient is plotted in the SF Estuary
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Data sources

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Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
   Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

1999 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕ 0
- • 0.01-1
- ● 1.01-10
- ⬤ 10.01-100
- ⬤ 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

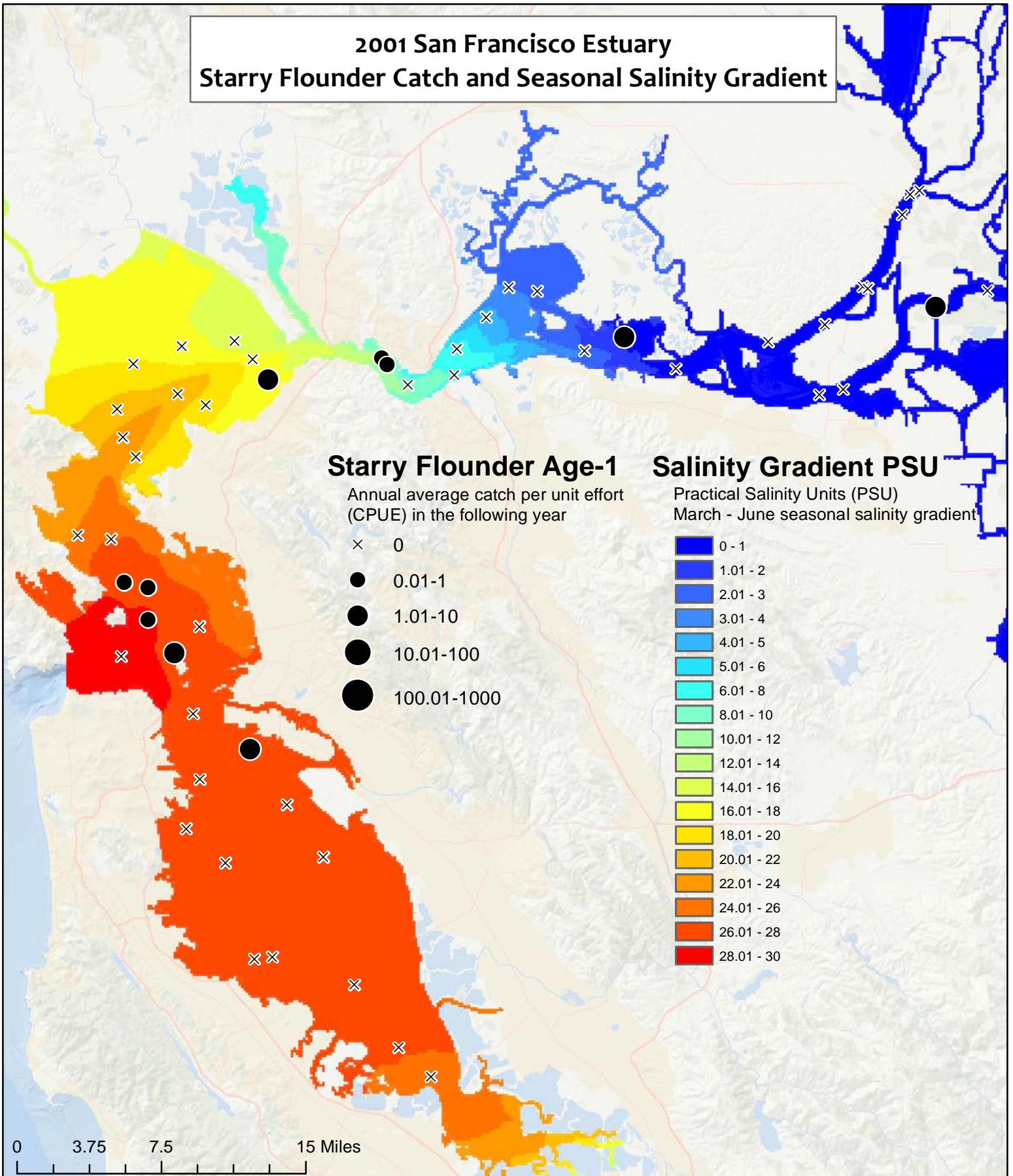0   3.75   7.5   15 Miles

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2000 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- ●   0.01-1
- ●   1.01-10
- ●   10.01-100
- ●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
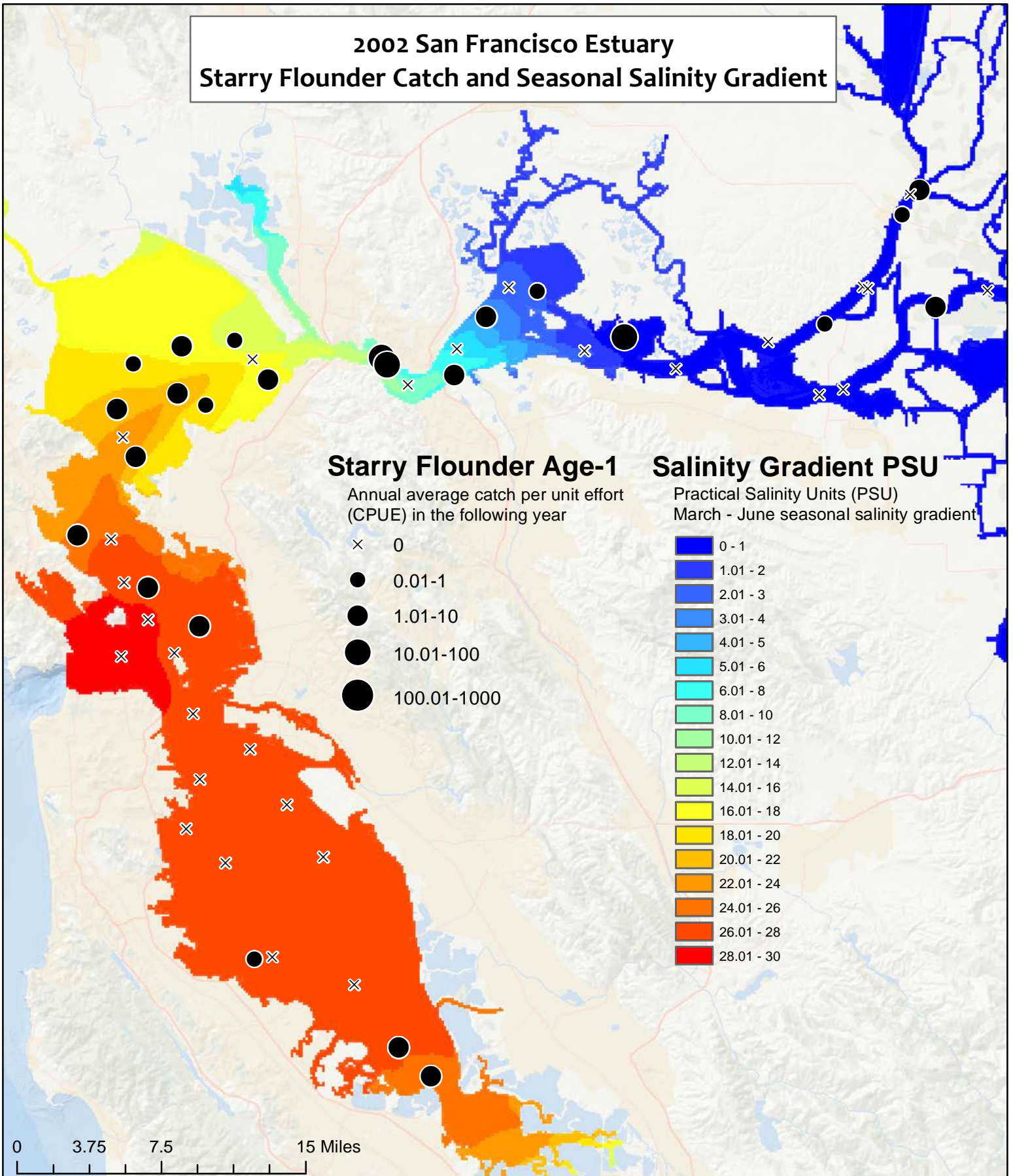- 28.01 - 30

0   3.75   7.5   15 Miles

About this map

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2001 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

✕	0
●	0.01-1
●	1.01-10
●	10.01-100
●	100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

	0 - 1
	1.01 - 2
	2.01 - 3
	3.01 - 4
	4.01 - 5
	5.01 - 6
	6.01 - 8
	8.01 - 10
	10.01 - 12
	12.01 - 14
	14.01 - 16
	16.01 - 18
	18.01 - 20
	20.01 - 22
	22.01 - 24
	24.01 - 26
	26.01 - 28
	28.01 - 30

0   3.75   7.5   15 Miles
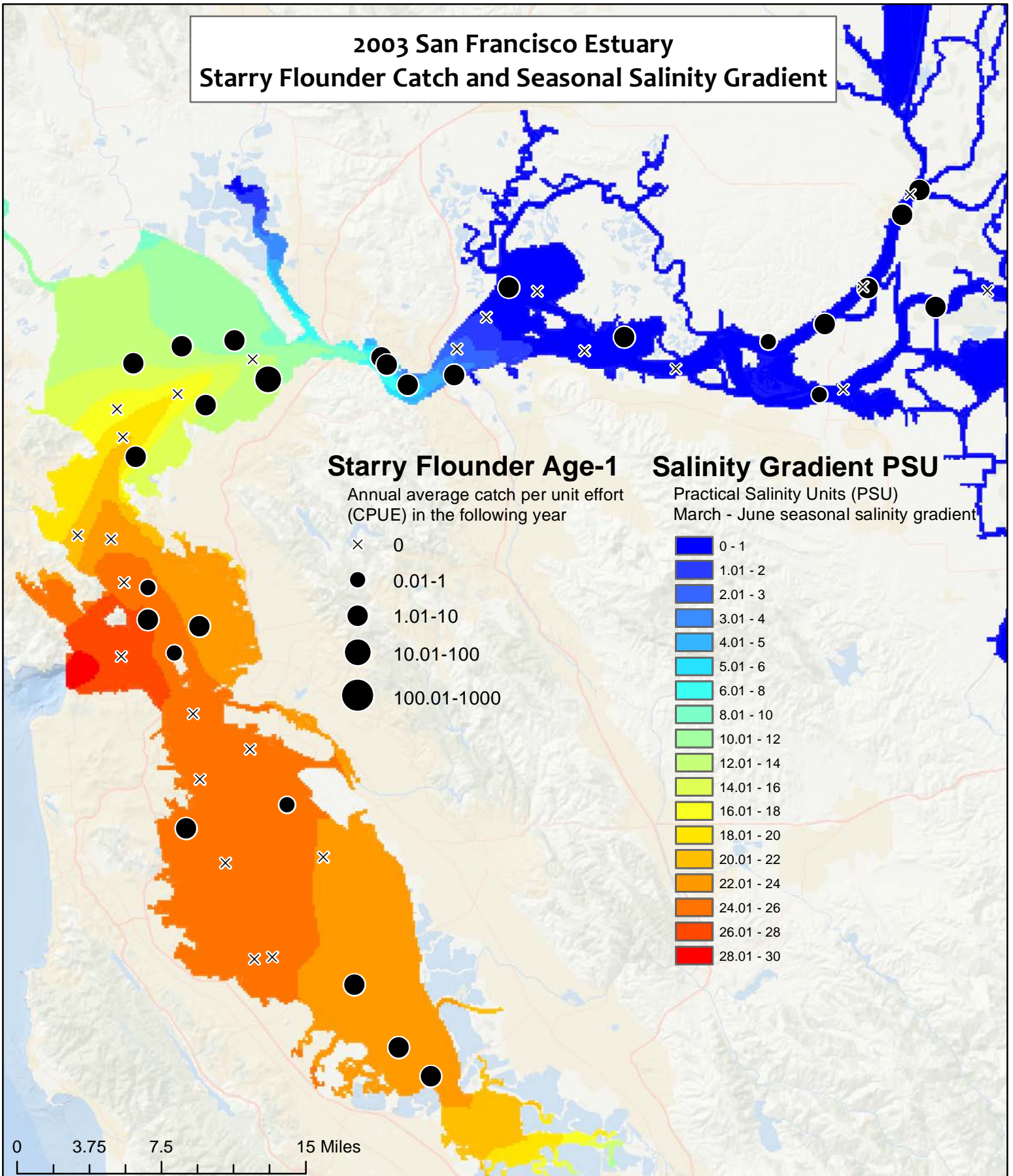
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Data sources

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Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

2002 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- •   0.01-1
- ●   1.01-10
- ⬤   10.01-100
- ⬤   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30
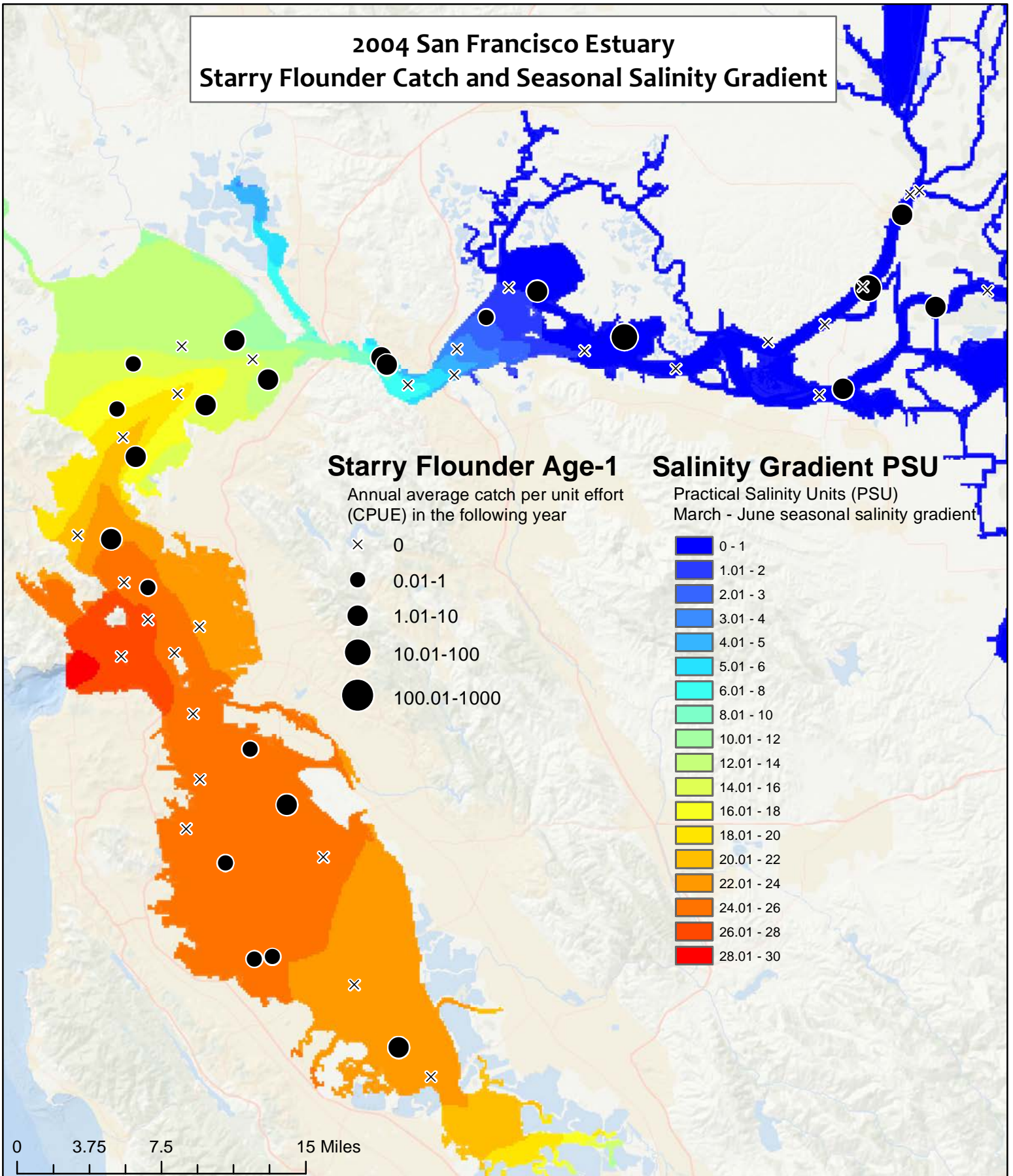
0   3.75   7.5   15 Miles

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2003 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

×   0

●   0.01-1

●   1.01-10

●   10.01-100

●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30
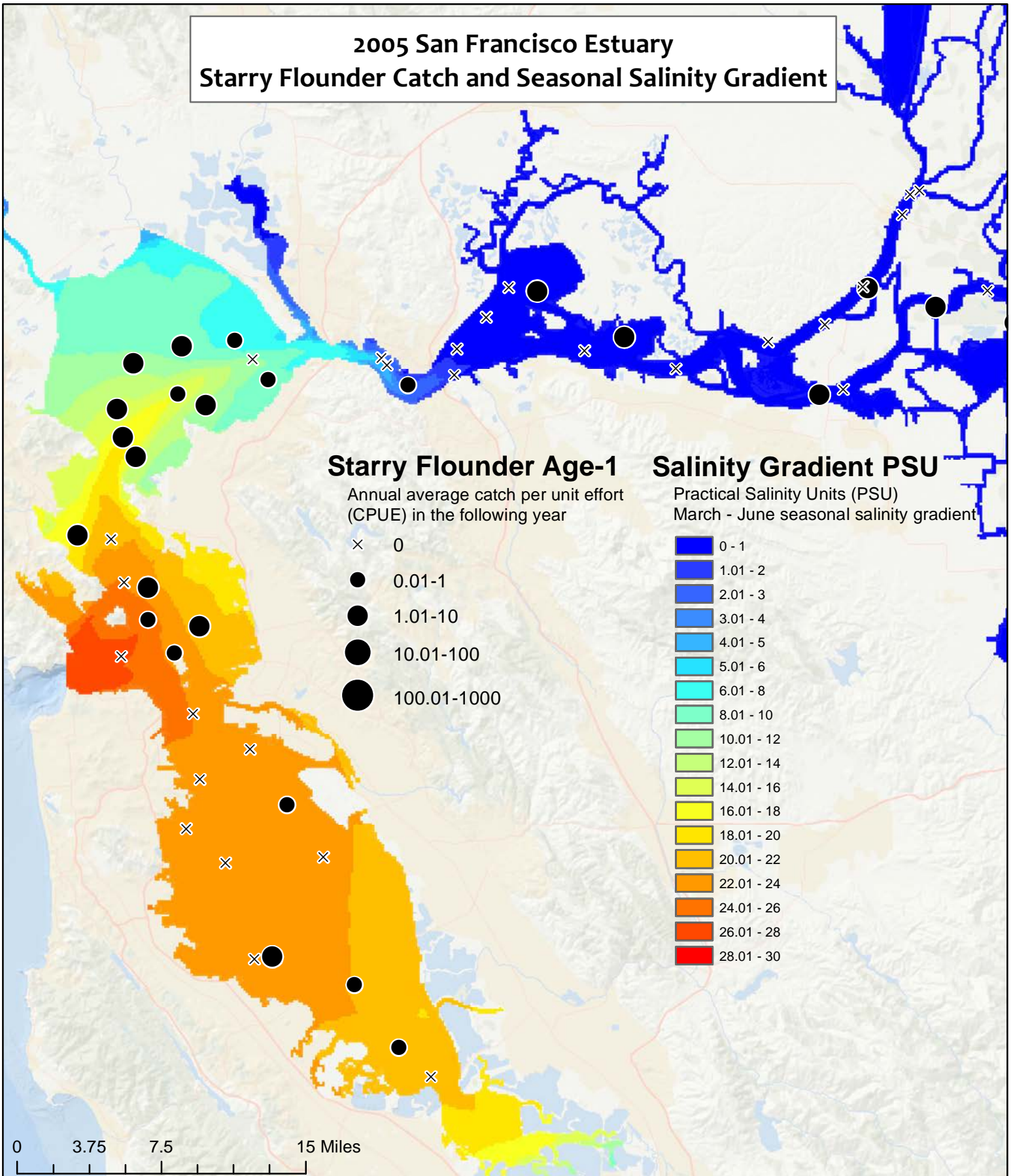
0   3.75   7.5   15 Miles

About this map

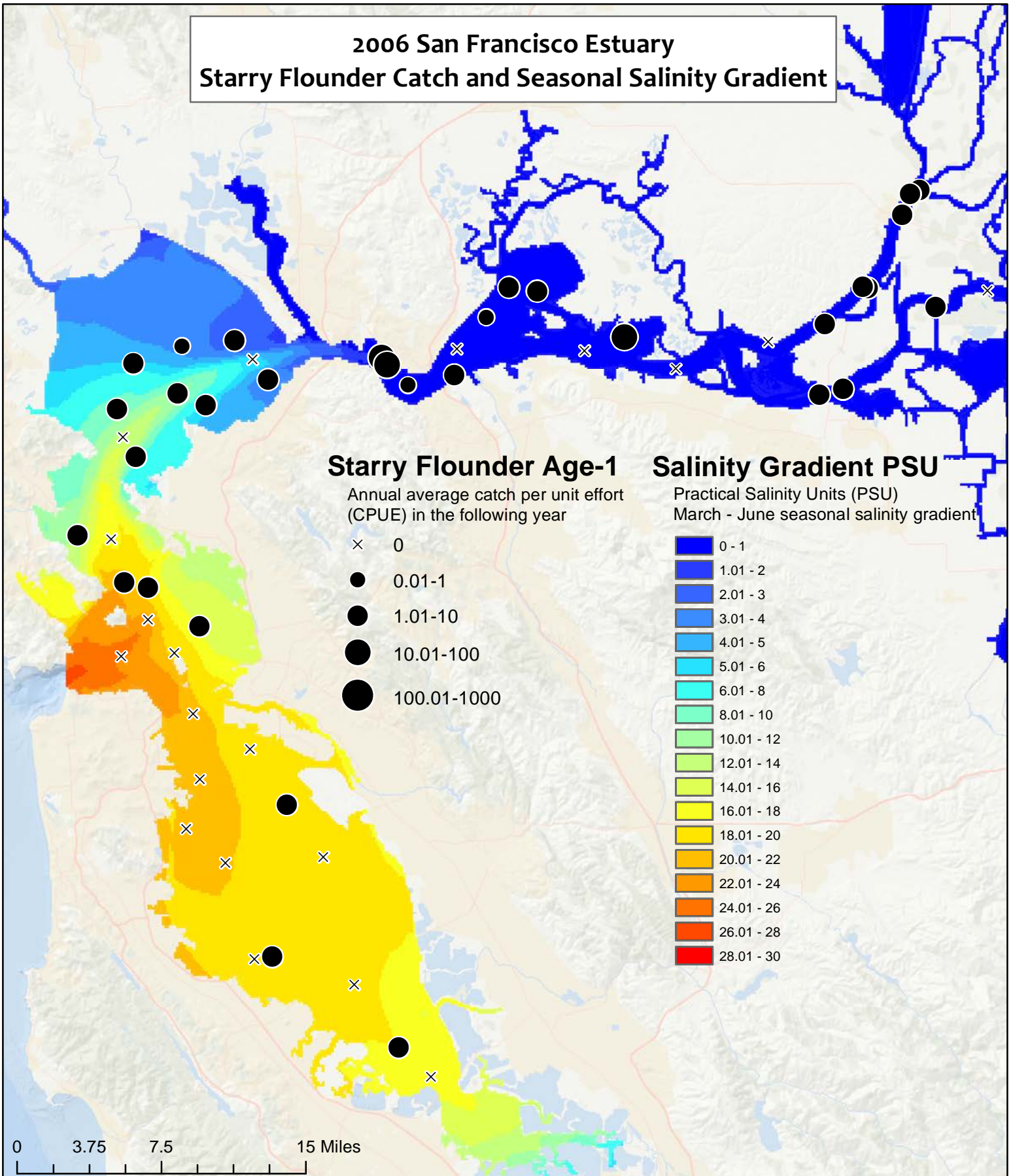The March to June seasonal salinity gradient is plotted in the SF Estuary
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2004 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

Symbol	Value
×	0
●	0.01-1
●	1.01-10
●	10.01-100
●	100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

Color	Range
	0 - 1
	1.01 - 2
	2.01 - 3
	3.01 - 4
	4.01 - 5
	5.01 - 6
	6.01 - 8
	8.01 - 10
	10.01 - 12
	12.01 - 14
	14.01 - 16
	16.01 - 18
	18.01 - 20
	20.01 - 22
	22.01 - 24
	24.01 - 26
	26.01 - 28
	28.01 - 30

0	3.75	7.5		15 Miles

2005 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

Symbol	Value
×	0
•	0.01-1
●	1.01-10
●	10.01-100
●	100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

Color	PSU Range
	0 - 1
	1.01 - 2
	2.01 - 3
	3.01 - 4
	4.01 - 5
	5.01 - 6
	6.01 - 8
	8.01 - 10
	10.01 - 12
	12.01 - 14
	14.01 - 16
	16.01 - 18
	18.01 - 20
	20.01 - 22
	22.01 - 24
	24.01 - 26
	26.01 - 28
	28.01 - 30

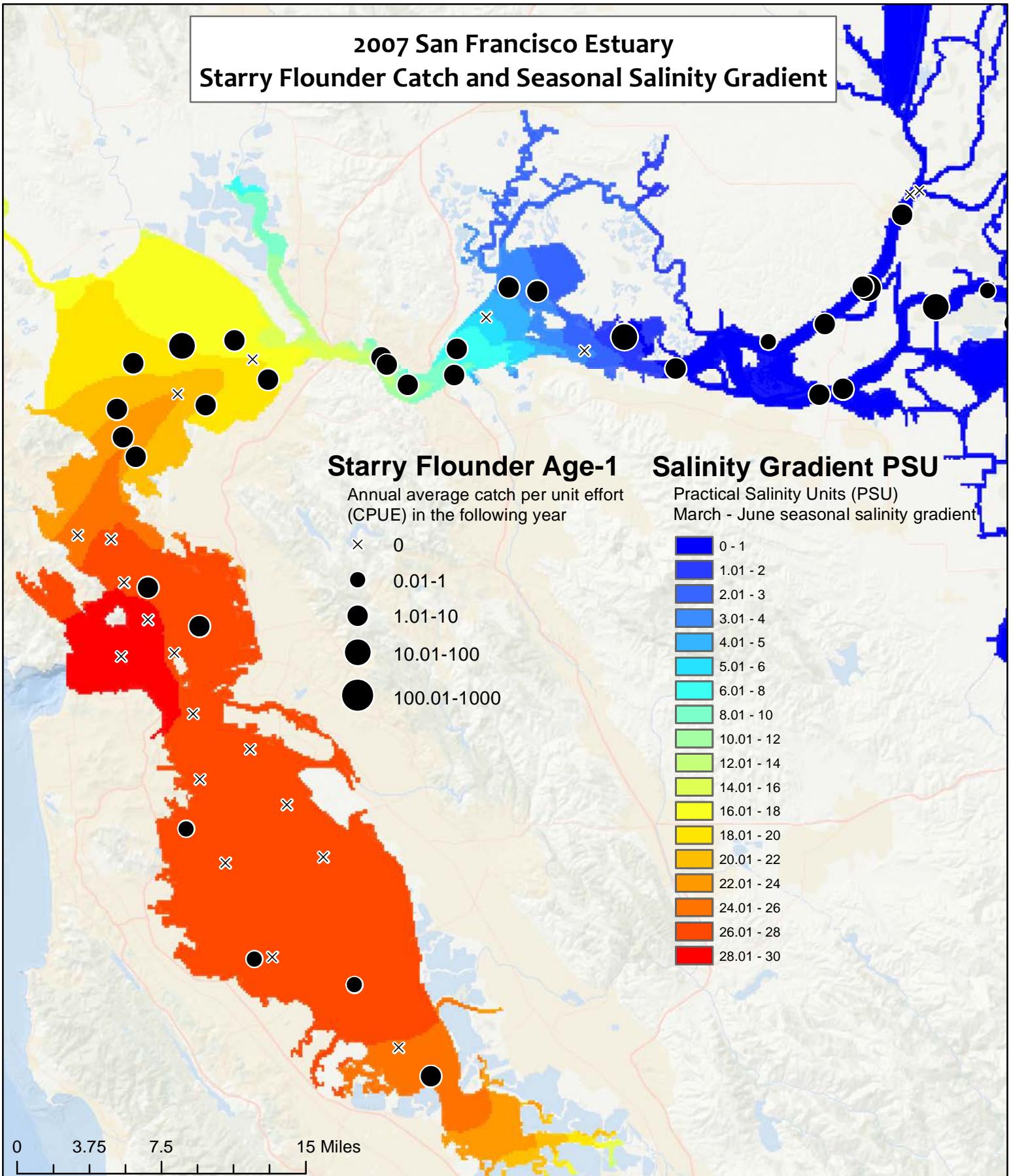0   3.75   7.5   15 Miles

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Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

2006 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

×	0
•	0.01-1
●	1.01-10
●	10.01-100
⬤	100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

	0 - 1
	1.01 - 2
	2.01 - 3
	3.01 - 4
	4.01 - 5
	5.01 - 6
	6.01 - 8
	8.01 - 10
	10.01 - 12
	12.01 - 14
	14.01 - 16
	16.01 - 18
	18.01 - 20
	20.01 - 22
	22.01 - 24
	24.01 - 26
	26.01 - 28
	28.01 - 30

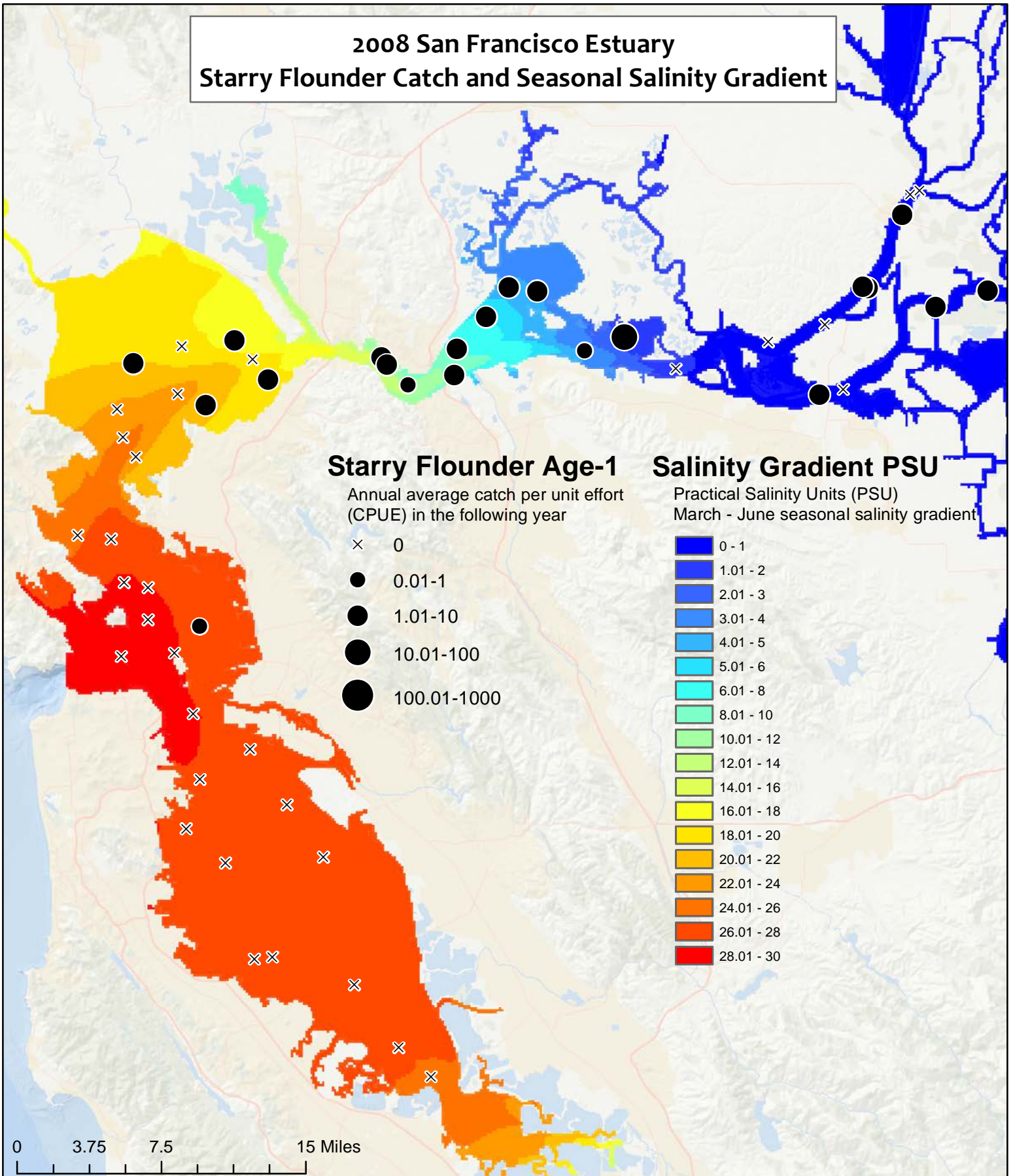0   3.75   7.5   15 Miles

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2007 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort (CPUE) in the following year

- ✕ 0
- • 0.01-1
- ● 1.01-10
- ● 10.01-100
- ● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

0   3.75   7.5   15 Miles

2008 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- ●   0.01-1
- ●   1.01-10
- ●   10.01-100
- ●   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

0   3.75   7.5   15 Miles

2009 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

✕	0
●	0.01-1
●	1.01-10
●	10.01-100
●	100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

	0 - 1
	1.01 - 2
	2.01 - 3
	3.01 - 4
	4.01 - 5
	5.01 - 6
	6.01 - 8
	8.01 - 10
	10.01 - 12
	12.01 - 14
	14.01 - 16
	16.01 - 18
	18.01 - 20
	20.01 - 22
	22.01 - 24
	24.01 - 26
	26.01 - 28
	28.01 - 30

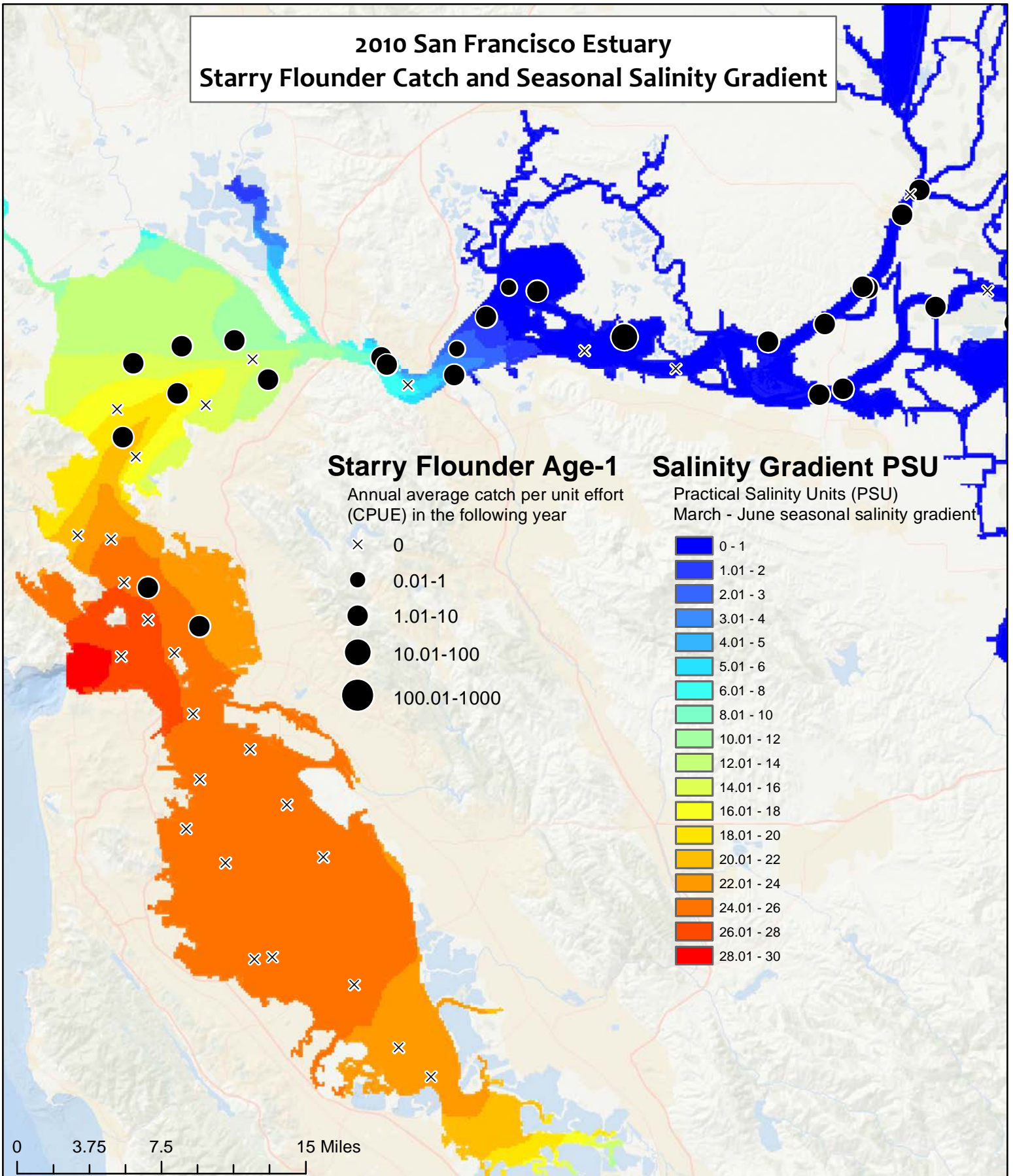0   3.75   7.5   15 Miles

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2010 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- ✕   0
- •   0.01-1
- ●   1.01-10
- ●   10.01-100
- ⬤   100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
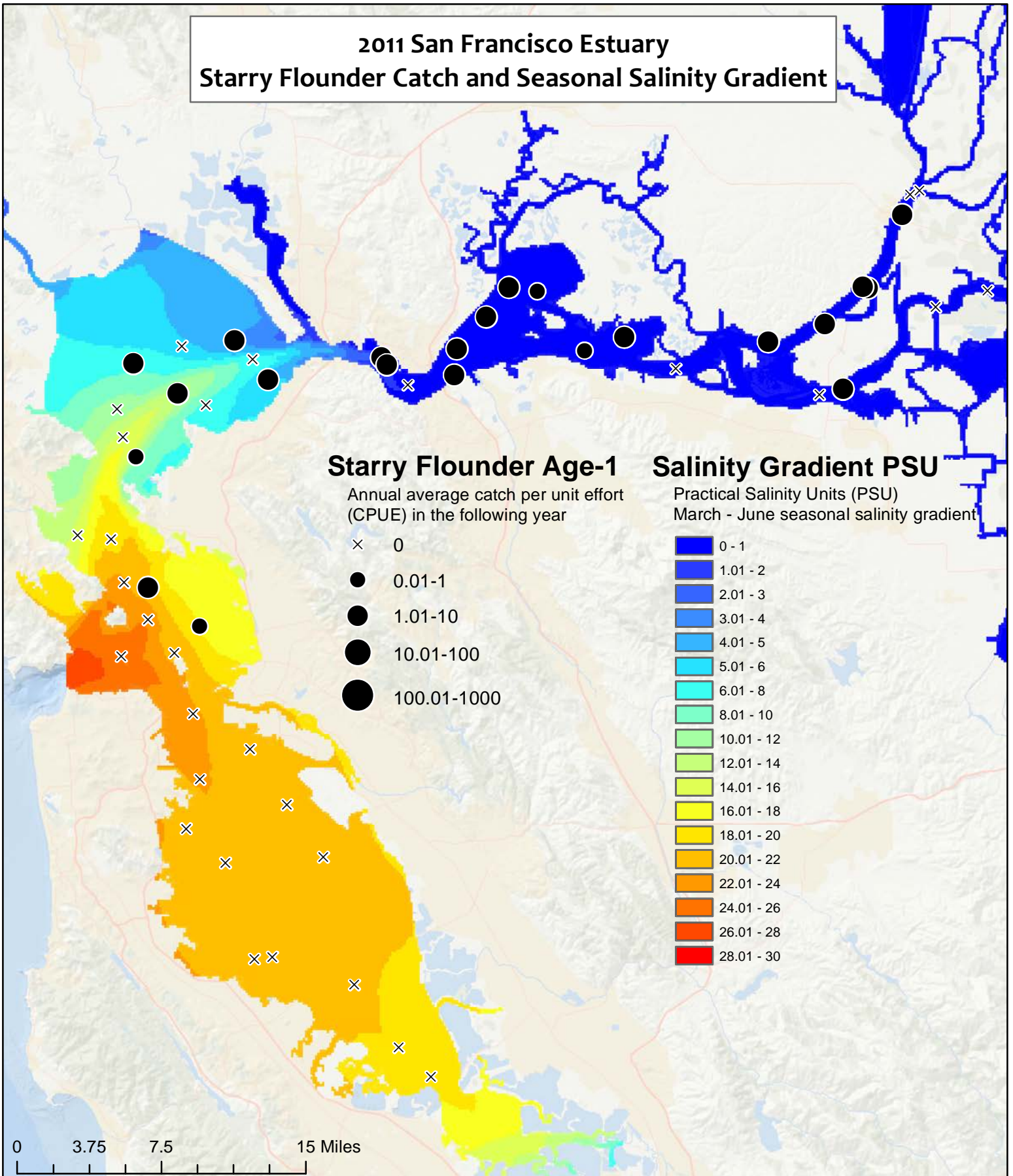- 28.01 - 30

0   3.75   7.5   15 Miles

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Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others

2011 San Francisco Estuary
Starry Flounder Catch and Seasonal Salinity Gradient

Starry Flounder Age-1

Annual average catch per unit effort
(CPUE) in the following year

- × 0
- • 0.01-1
- • 1.01-10
- ● 10.01-100
- ● 100.01-1000

Salinity Gradient PSU

Practical Salinity Units (PSU)
March - June seasonal salinity gradient

- 0 - 1
- 1.01 - 2
- 2.01 - 3
- 3.01 - 4
- 4.01 - 5
- 5.01 - 6
- 6.01 - 8
- 8.01 - 10
- 10.01 - 12
- 12.01 - 14
- 14.01 - 16
- 16.01 - 18
- 18.01 - 20
- 20.01 - 22
- 22.01 - 24
- 24.01 - 26
- 26.01 - 28
- 28.01 - 30

0   3.75   7.5   15 Miles

About this map

The March to June seasonal salinity gradient is plotted in the SF Estuary
beneath the annual average CPUE of age-1 starry flounder for each monitoring
station in the SF Bay Study otter trawl. Salinity conditions shown are one year
prior to CPUE data consistent with the salinity-abundance relationship published
in Kimmerer (2002), Marine Ecology and Progress Series 243: 39-55.

WTR1502244.6   E. Foresman 7/13/2015

Data sources

Fish CPUE - San Francisco Bay Study CA Department of Fish and Wildlife
    and the Interagency Ecological Program
Salinity Gradient - Coarse-grid version of UnTRIM San Francisco Bay-Delta
    Model, Delta Modeling Associates
Basemap - ESRI, DeLorme, BEBCO, NAANGDC, & others