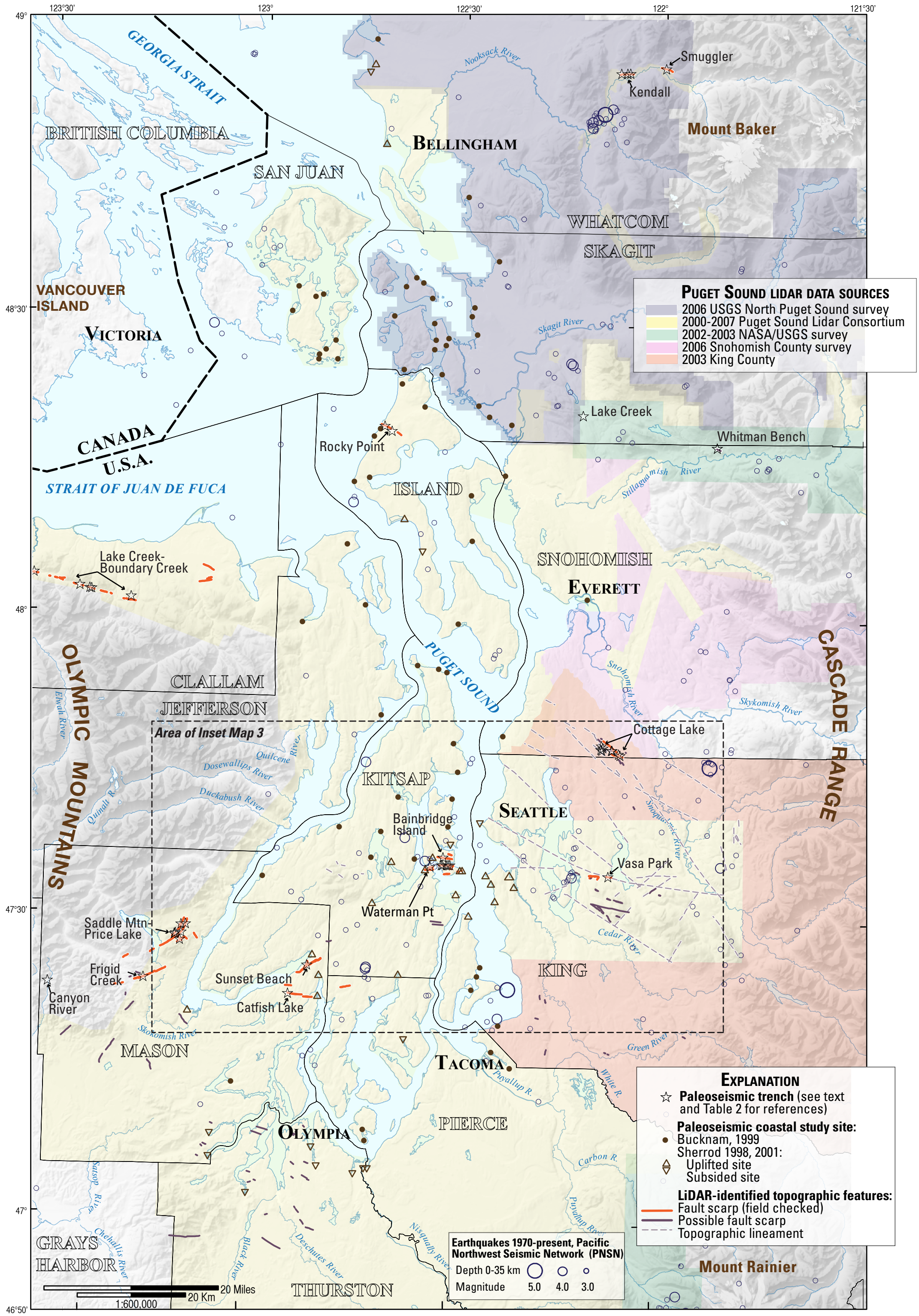
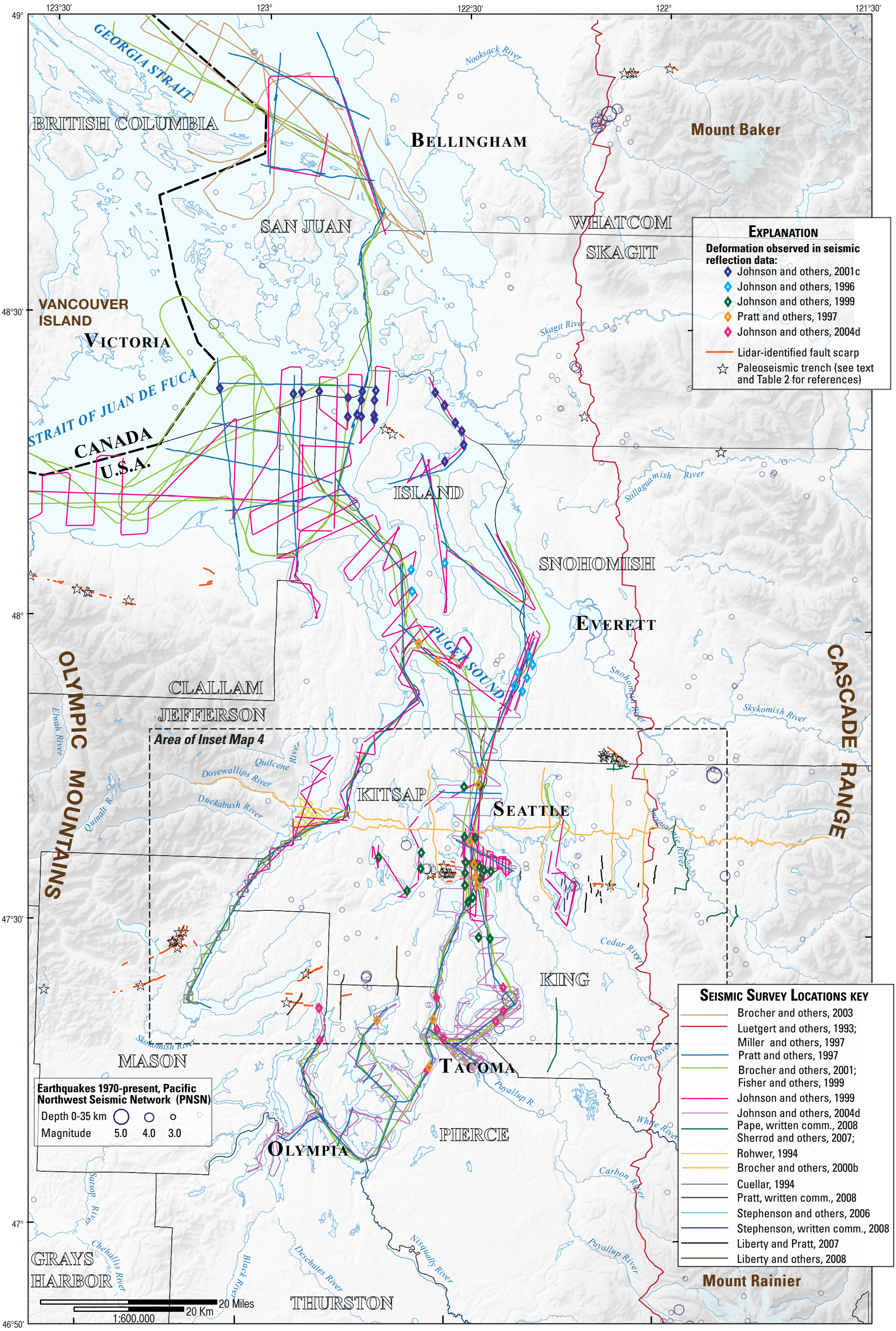
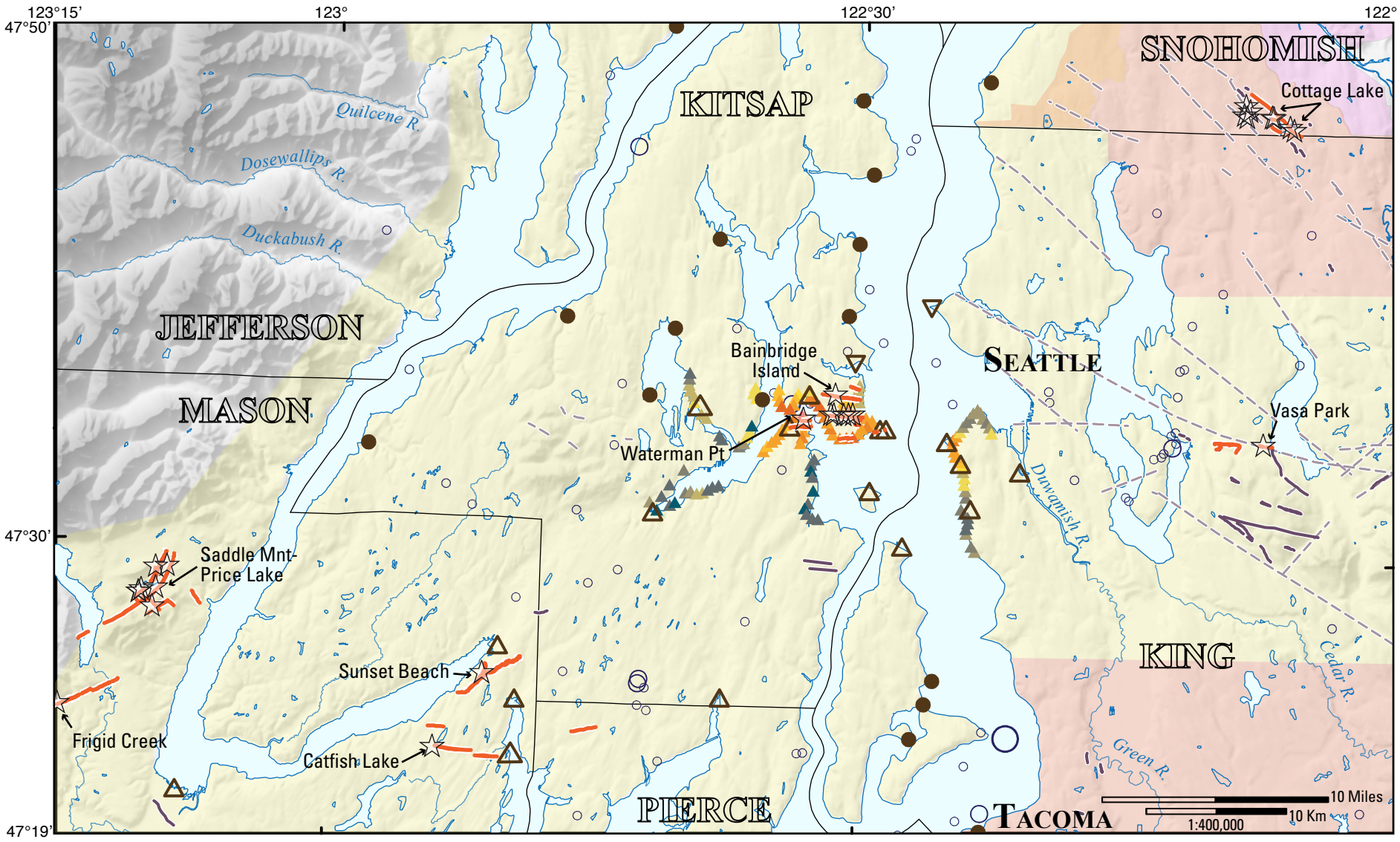


MAP 1: PALEOSEISMIC STUDIES IN PUGET LOWLAND



MAP 2: SEISMIC SURVEY LOCATIONS IN PUGET LOWLAND



Inset map 3: Paleoseismic Studies in Seattle/Tacoma Region

Explanation

Paleoseismic coastal study site:
- Bucknam, 1999
- Sherrod 1998, 2001:
  - Uplifted site
  - Subsided site

Paleoseismic trench (see text and Table 2 for references)

LiDAR-identified topographic features:
- Fault scarp (field checked)
- Possible fault scarp
- Topographic lineament

Puget Sound lidar data sources:
- 2000-2007 Puget Sound Lidar Consortium
- 2006 Snohomish County survey
- 2003 King County data

Earthquakes 1970-present, Pacific Northwest Seismic Network (PNSN)

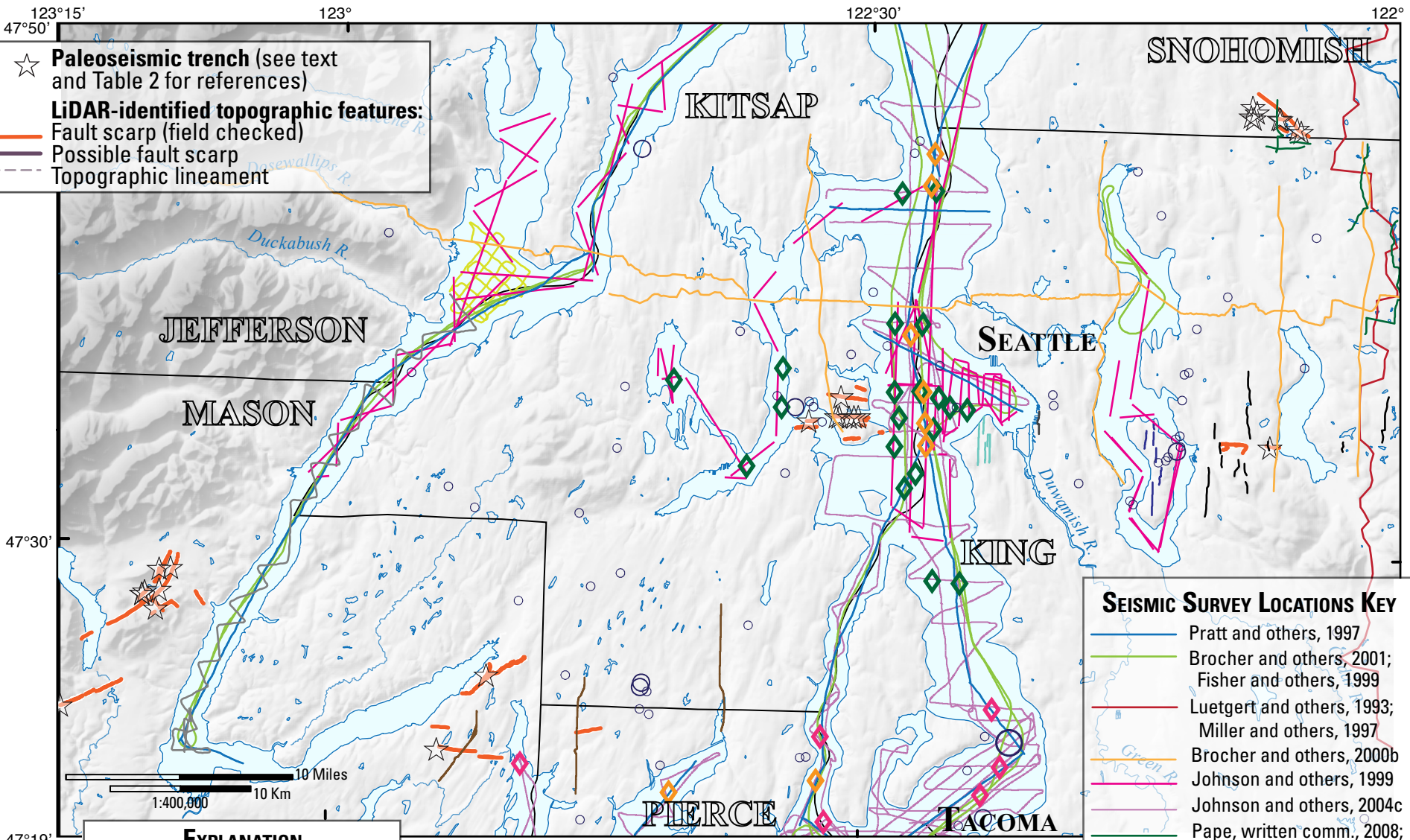
Depth 0-35 km

Magnitude 5.0 4.0 3.0

Shoreline Uplift

Traingles denote Uplift (m): 8.5, 7, 5, 3, 1

LiDAR-modeled shoreline uplift during AD 900 Seattle Fault earthquake (Muller and Harding, 2005)



Paleoseismic trench (see text and Table 2 for references)

LiDAR-identified topographic features:
- Fault scarp (field checked)
- Possible fault scarp
- Topographic lineament

Seismic Survey Locations Key
- Pratt and others, 1997
- Brocher and others, 2001; Fisher and others, 1999
- Luetgert and others, 1993; Miller and others, 1997
- Brocher and others, 2000b
- Johnson and others, 1999
- Johnson and others, 2004c
- Pape, written comm., 2008; Sherrod and others, 2008
- Rohwer, 1994
- Cuellar, 1994
- Pratt, written comm., 2008
- Stephenson and others, 2006
- Stephenson, written comm., 2008
- Liberty and Pratt, 2007
- Liberty and others, 2008

Explanation

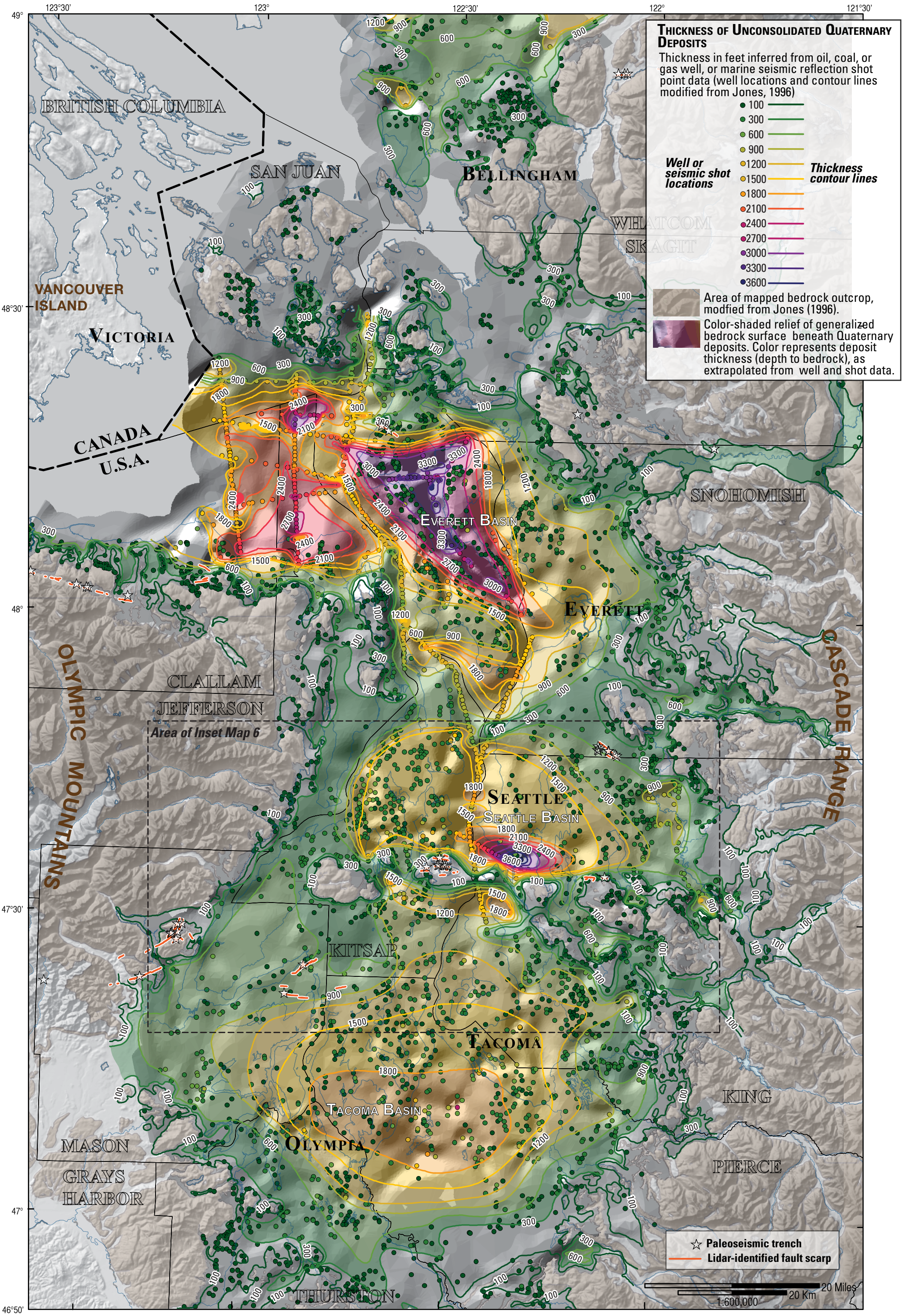
Deformation observed in seismic reflection data:
- Johnson and others, 1999
- Pratt and others, 1997
- Johnson and others, 2004c

Inset map 4: Seismic Survey Locations in Seattle/Tacoma Region

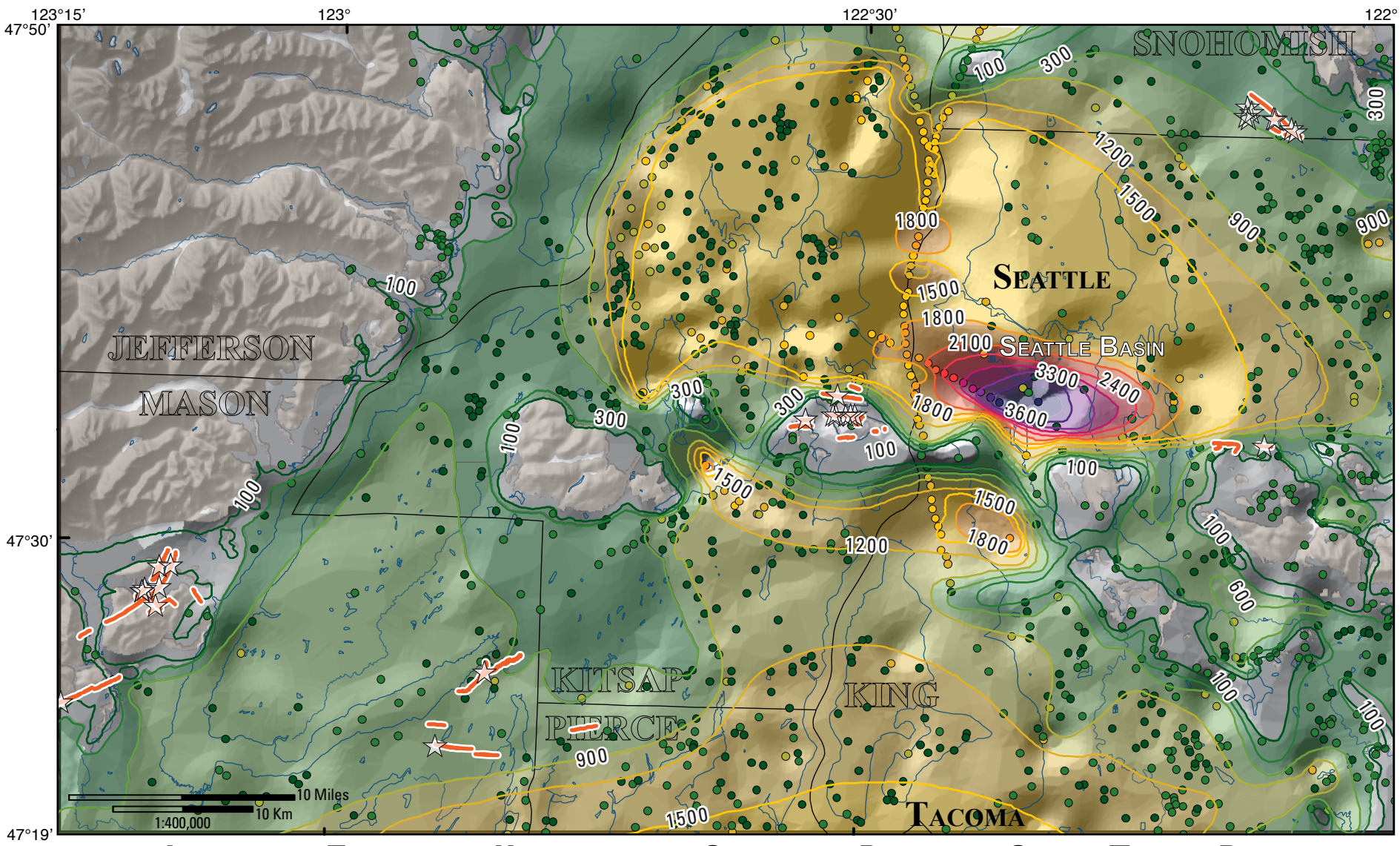
Earthquakes 1970-present, Pacific Northwest Seismic Network (PNSN)

Depth 0-35 km

Magnitude 5.0 4.0 3.0



Map 5: Thickness of Unconsolidated Quaternary Deposits in Puget Lowland



INSET MAP 6: THICKNESS OF UNCONSOLIDATED QUATERNARY DEPOSITS IN SEATTLE/TACOMA REGION

THICKNESS OF UNCONSOLIDATED QUATERNARY DEPOSITS

Thickness in feet inferred from oil, coal, or gas well, or marine seismic reflection shot point data (well locations and contour lines modified from Jones, 1996)

Well or seismic shot locations

Thickness contour lines

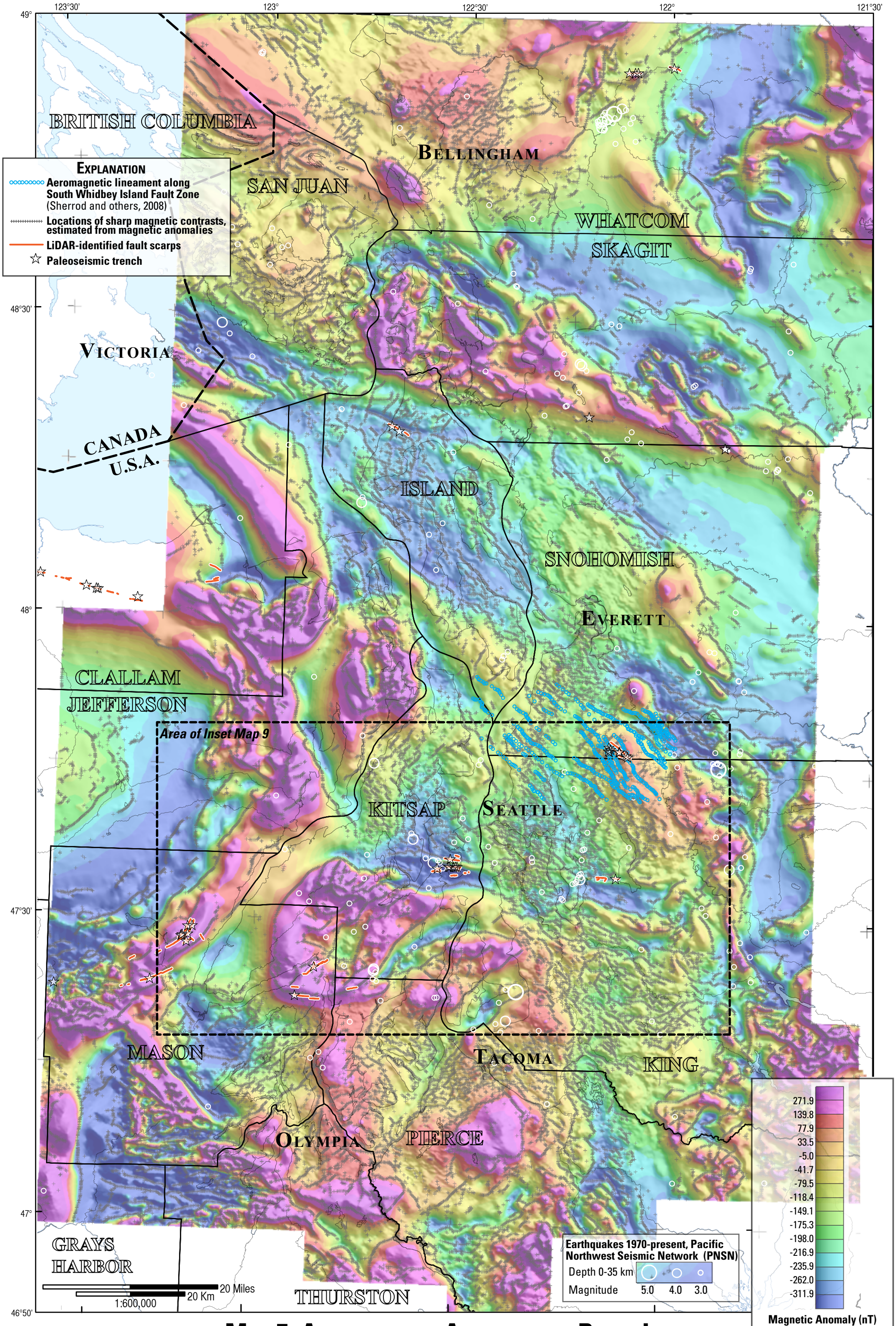
- 100
- 300
- 600
- 900
- 1200
- 1500
- 1800
- 2100
- 2400
- 2700
- 3000
- 3300
- 3600

Area of mapped bedrock outcrop, modfied from Jones (1996).

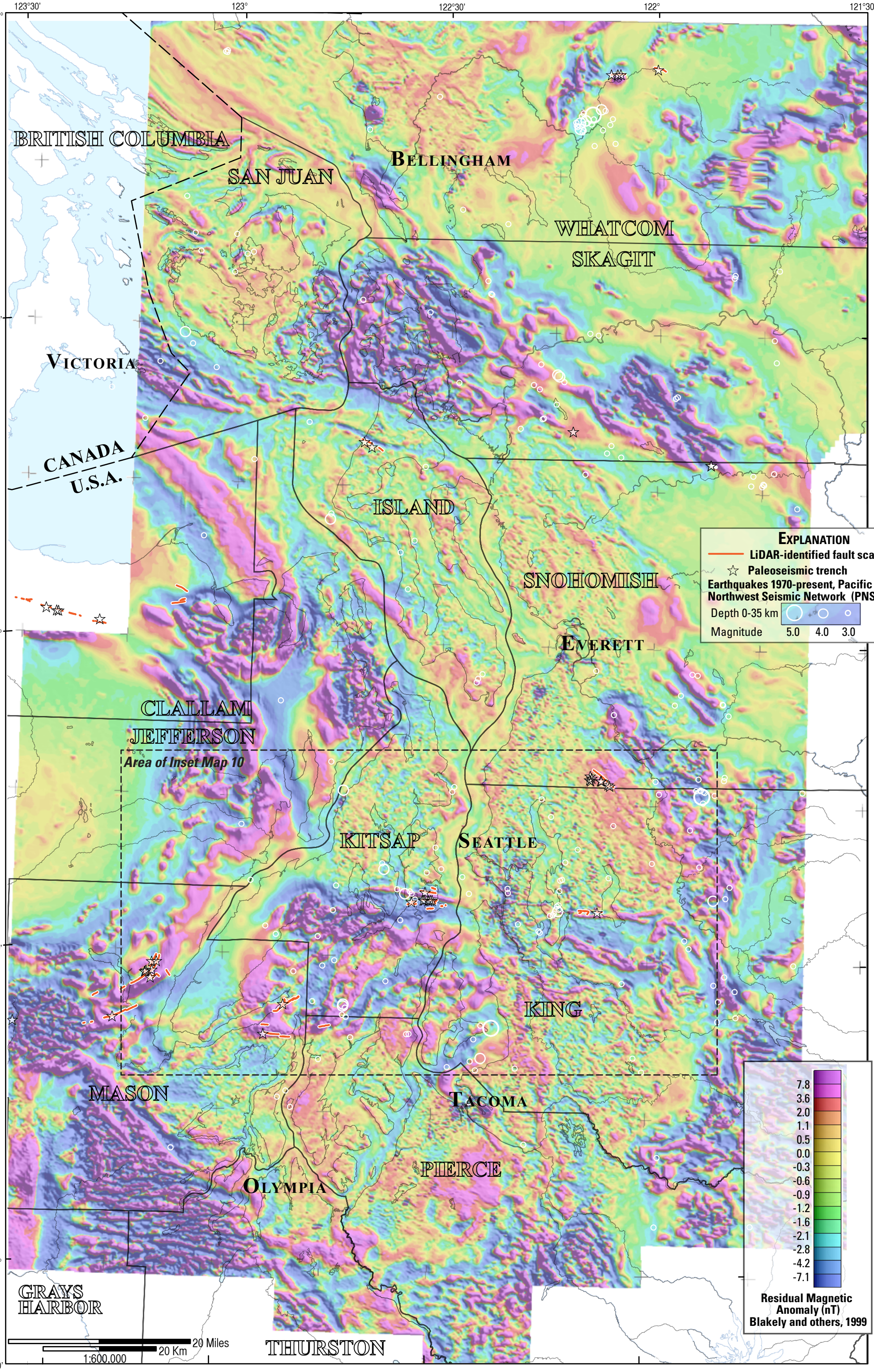
Color-shaded relief of generalized bedrock surface beneath Quaternary deposits. Color represents deposit thickness (depth to bedrock), as extrapolated from well and shot data.

Paleoseismic trench

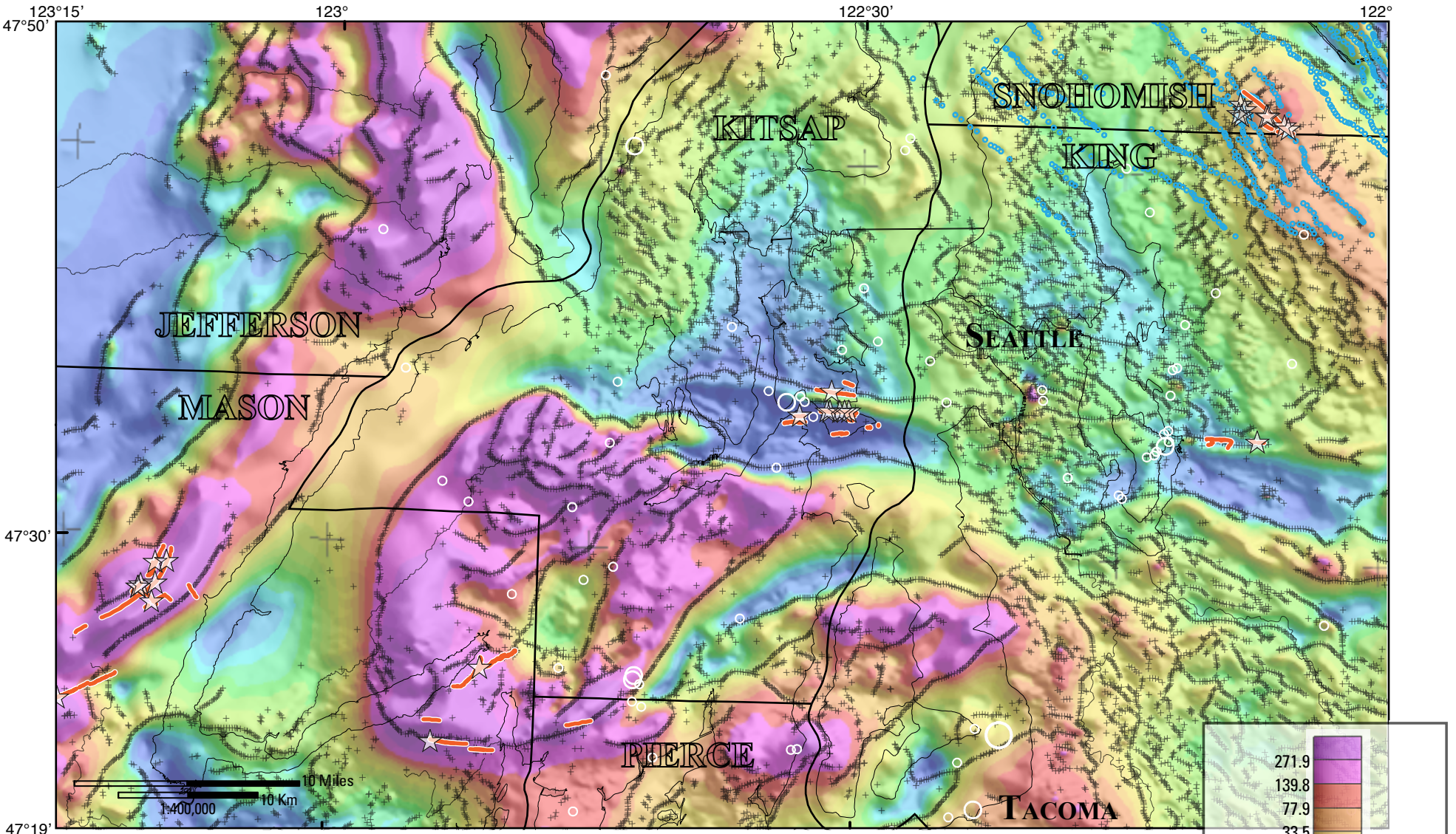
Lidar-identified fault scarp



Map 7: Aeromagnetic Anomalies in Puget Lowland



MAP 8: RESIDUAL AEROMAGNETIC ANOMALIES IN PUGET LOWLAND



Explanation

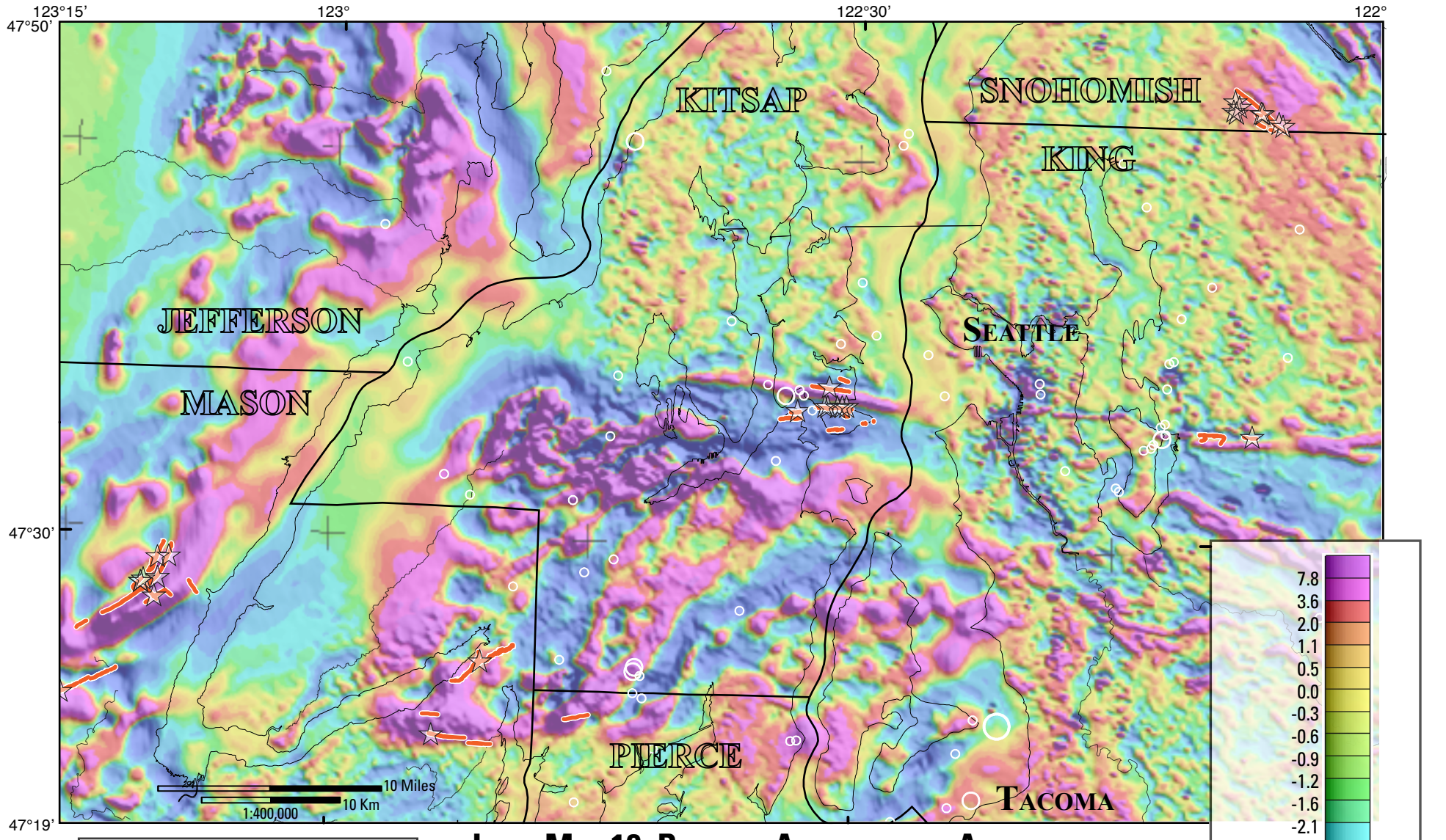
- Aeromagnetic lineament along South Whidbey Island Fault Zone (Sherrod and others, 2008)
- Locations of sharp magnetic contrasts, estimated from magnetic anomalies
- LiDAR-identified fault scarps
- Paleoseismic trench

Inset Map 9: Aeromagnetic Anomalies in Seattle/Tacoma Region

Earthquakes 1970-present, Pacific Northwest Seismic Network (PNSN)

Depth 0-35 km

Magnitude 5.0 4.0 3.0



Explanation

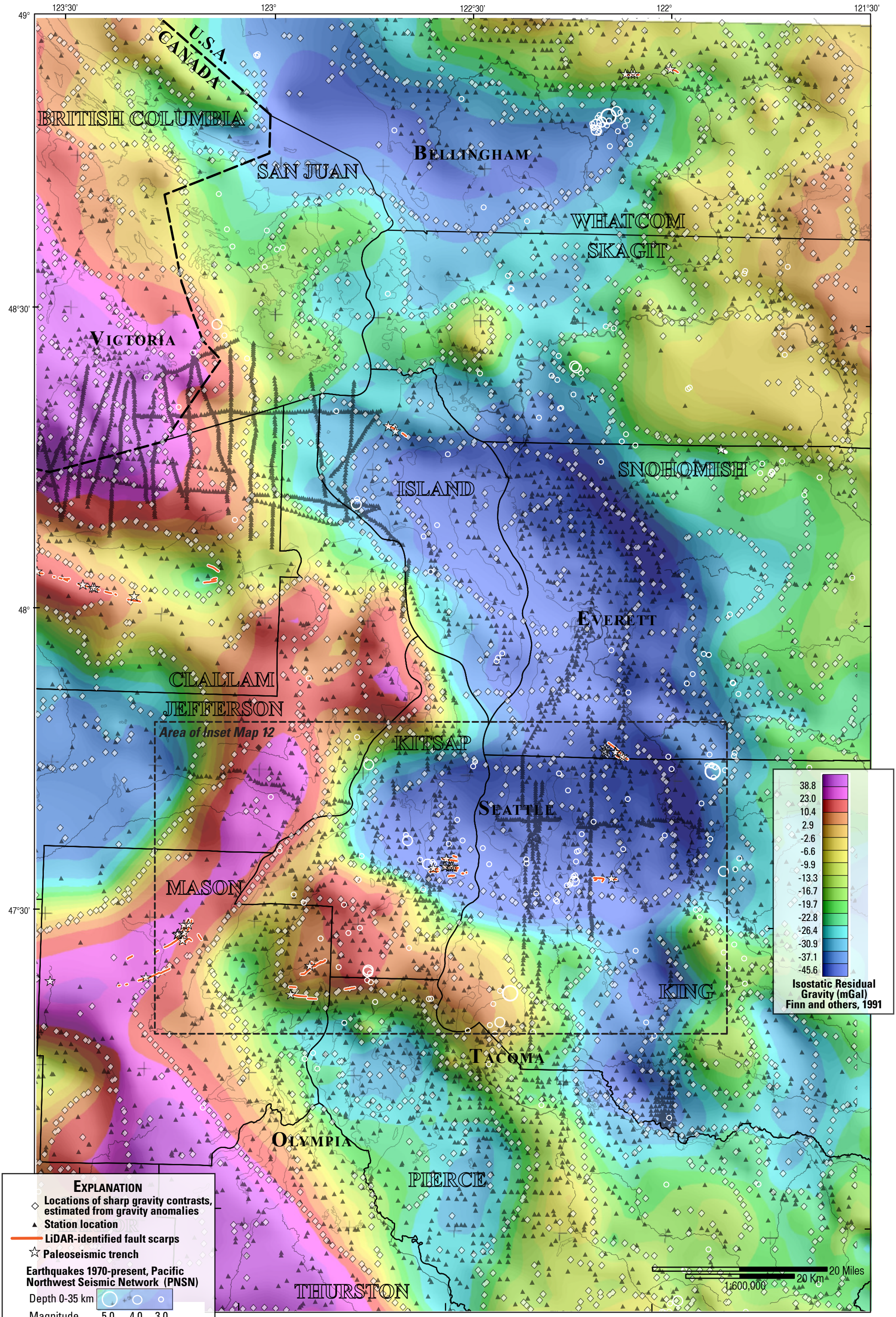
- LiDAR-identified fault scarps
- Paleoseismic trench

Inset Map 10: Residual Aeromagnetic Anomalies in Seattle/Tacoma Region

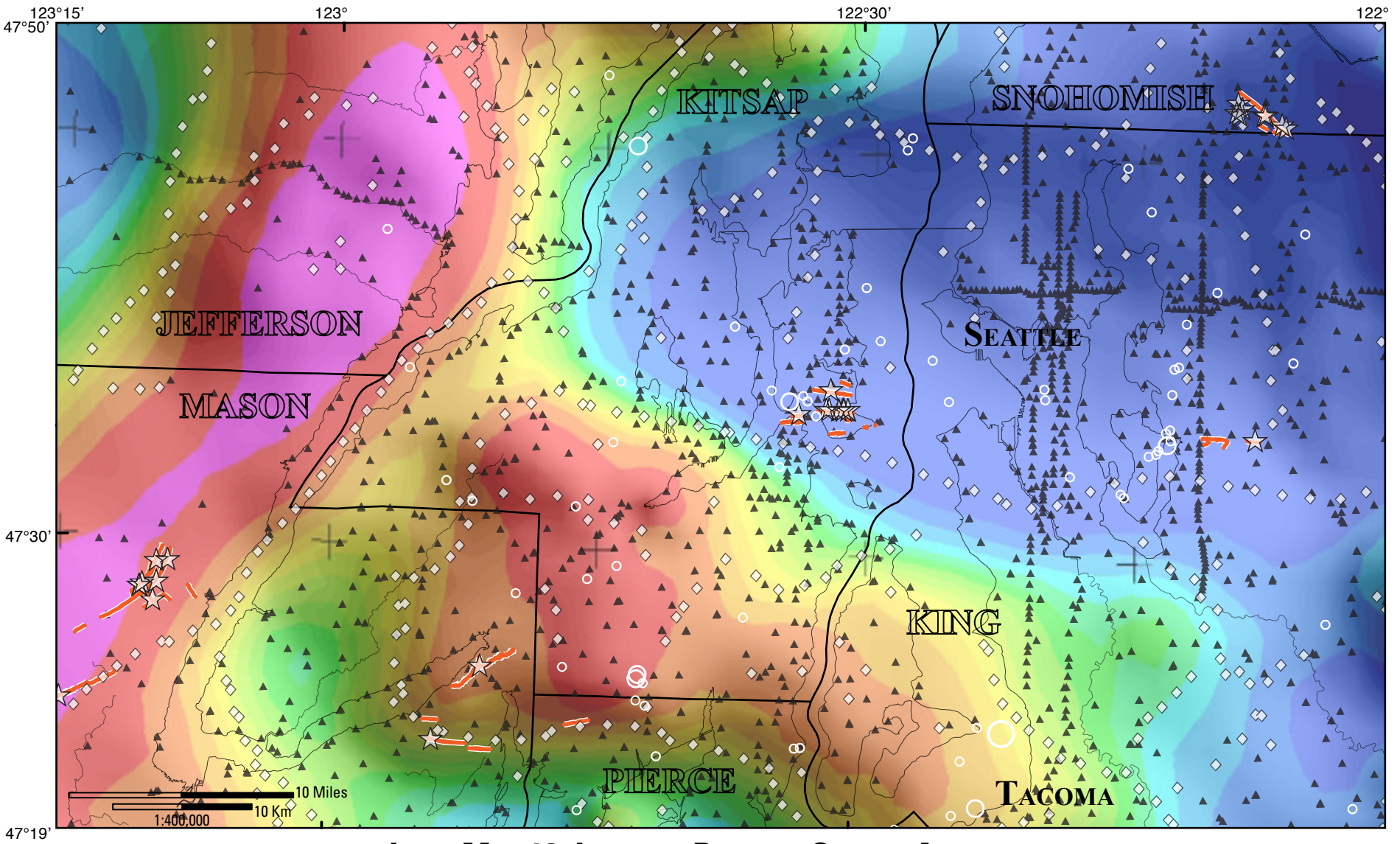
Earthquakes 1970-present, Pacific Northwest Seismic Network (PNSN)

Depth 0-35 km

Magnitude 5.0 4.0 3.0



MAP 11: ISOSTATIC RESIDUAL GRAVITY ANOMALIES IN PUGET LOWLAND



Inset Map 12: Isostatic Residual Gravity Anomalies in Seattle/Tacoma Region

Explanation

- Locations of sharp gravity contrasts, estimated from gravity anomalies
- Station location
- LiDAR-identified fault scarps
- Paleoseismic trench

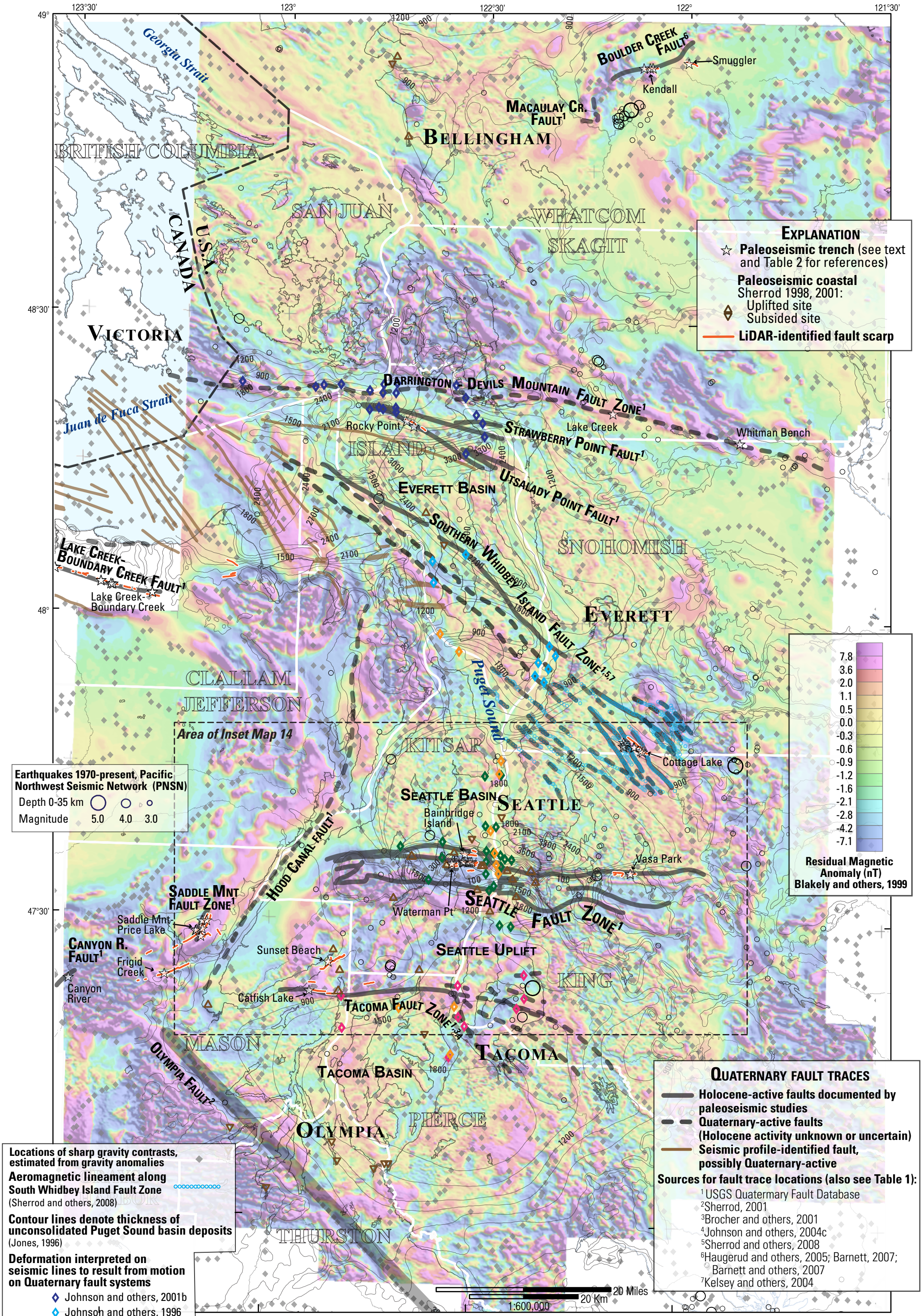
Earthquakes 1970-present, Pacific Northwest Seismic Network (PNSN)

Depth 0-35 km

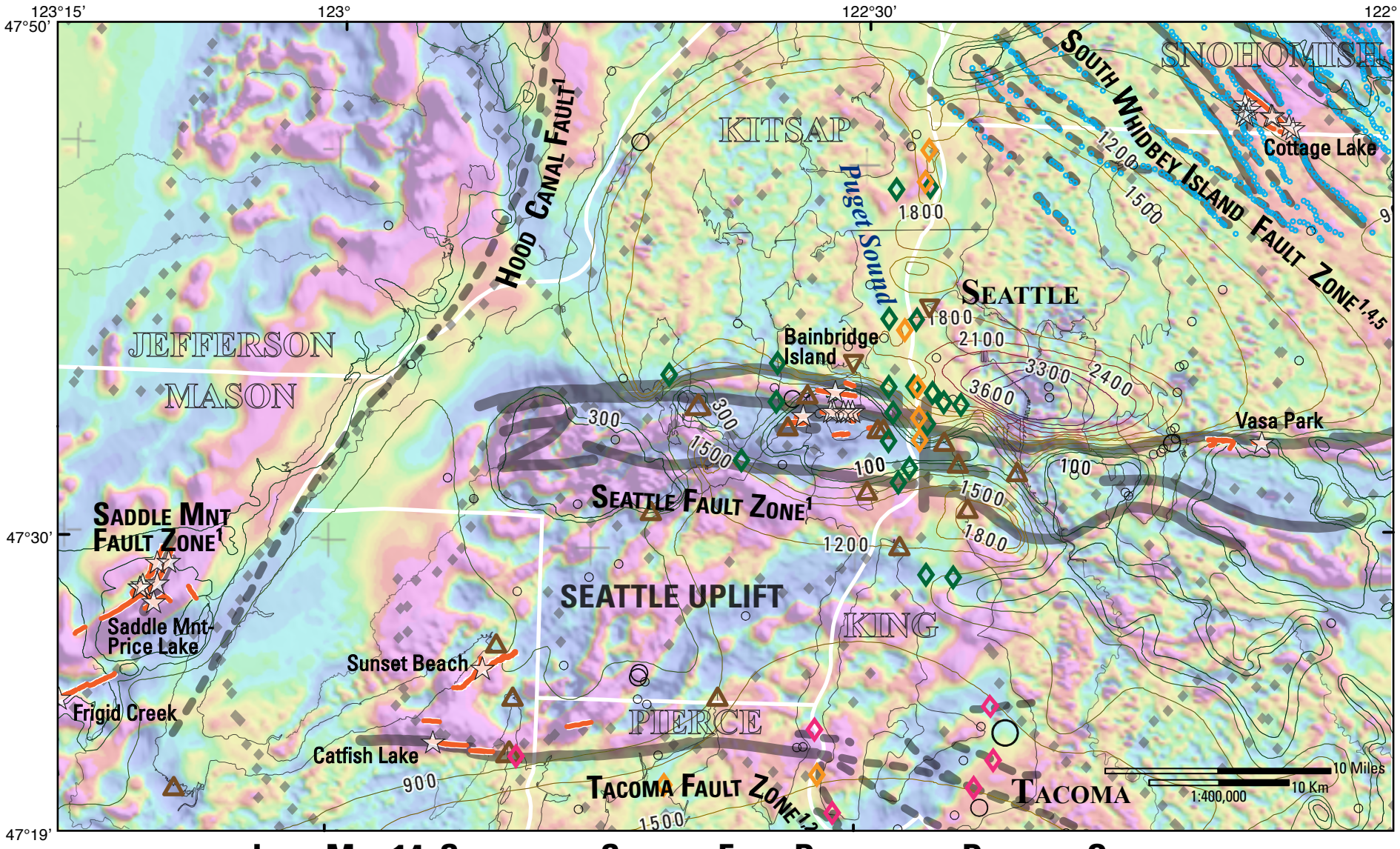
Magnitude 5.0 4.0 3.0

38.8
23.0
10.4
2.9
-2.6
-6.6
-9.9
-13.3
-16.7
-19.7
-22.8
-26.4
-30.9
-37.1
-45.6

Isostatic Residual Gravity (mGal)
Finn and others, 1991



Map 13: Summary of Shallow Fault Deformation Data and Quaternary Fault Traces in Puget Lowland, Draped over Residual Aeromagnetic Anomalies



Inset Map 14: Summary of Shallow Fault Deformation Data and Quaternary Fault Traces in Seattle/Tacoma Region, Draped over Residual Aeromagnetic Anomalies

Explanation

Paleoseismic trench (see text and Table 2 for references)

Paleoseismic coastal
Sherrod 1998, 2001:
- **Uplifted site**
- **Subsided site**

LiDAR-identified fault scarp

Locations of sharp gravity contrasts, estimated from gravity anomalies

Aeromagnetic lineament along South Whidbey Island Fault Zone
(Sherrod and others, 2008)

Contour lines denote thickness of unconsolidated Puget Sound basin deposits
(Jones, 1996)

Deformation interpreted on seismic lines to result from motion on Quaternary fault systems
- Johnson and others, 1999
- Pratt and others, 1997
- Johnson and others, 2004c

Earthquakes 1970-present, Pacific Northwest Seismic Network (PNSN)

Depth 0-35 km	○	○	○
Magnitude	5.0	4.0	3.0

Quaternary Fault Traces

- **Holocene-active faults documented by paleoseismic studies**
- **Quaternary-active faults (Holocene activity unknown or uncertain)**

Sources for fault trace locations (also see Table 1):
[1] USGS Quaternary Fault Database
[2] Brocher and others, 2001
[3] Johnson and others, 2004c
[4] Sherrod, and others, 2008
[5] Kelsey and others, 2004

7.8
3.6
2.0
1.1
0.5
0.0
-0.3
-0.6
-0.9
-1.2
-1.6
-2.1
-2.8
-4.2
-7.1

Residual Magnetic Anomaly (nT)
Blakely and others, 1999