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Quaternary Fault and Fold Database of the United States

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South Slough syncline (Class A) No. 891

Last Review Date: 2002-05-31

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Synopsis	The north-striking, northward plunging South Slough syncline was formed during ongoing east-west compression in the forearc of the Cascadia subduction zone [781]; the fold and associated faults are an onshore extension of a broad fold and thrust belt that is actively deforming the accretionary wedge offshore [784]. Associated faults include tear faults, flexural-slip faults that parallel bedding in the syncline, and other reverse or thrust faults whose relationship to folding in the syncline is unknown. Folding and flexural slip faulting in the South Slough area may be caused by thrust or reverse faulting on deeper structures. The syncline and most of the active faults warp and offset an extensive flight of 80 ka to less than or equal to 200 ka marine terrace platforms and sediments that ring the margins of South Slough. The syncline is the location of numerous studies of subsidence-related deformation associated with the Cascadia subduction zone. Some of this deformation could be caused by localized folding and

	faulting during shallow upper-plate earthquakes, but most subsidence is probably caused by regional or local deformation during very large subduction zone earthquakes.
Name comments	The South Slough syncline was named after South Slough, which occupies the axial position of the northern part of the fold. The fold was first mapped by Diller (1901 #4117), and later mapped and named by Allan and Baldwin (1944 #4162). The fold has been mapped or described in numerous subsequent publications (Baldwin, 1966 #4122; Baldwin and Beaulieu, 1973 #4145; Newton, 1980 #4144; Madin and others, 1995 #4158).
County(s) and State(s)	COOS COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:100,000 scale. *Comments:* The axial trace is from 1:24,000-scale (approximate) mapping of Madin and others (1995 #4158) and 1:190,000-scale (approximate) figure 4 of McInelly and Kelsey (1990 #4102).
Geologic setting	The north-striking, northward plunging South Slough syncline was formed during ongoing east-west compression in the forearc of the Cascadia subduction zone along the central Oregon coast (McInelly and Kelsey, 1990 #4102; Madin and others, 1995 #4158). The fold and associated faults [888, 889, and 890] are an onshore extension of a broad fold and thrust belt that is actively deforming the accretionary wedge offshore [784] (Goldfinger and others, 1992 #464; Nelson and Personius, 1996 #4128; McNeill and others, 1998 #4089). Some faults appear to be tear faults [888 and 889], and others are flexural-slip faults that parallel bedding in the syncline. The precise structural relationship between other reverse or thrust faults and folding in the syncline is unknown, but movement on these or other deeper structures may cause the folding and flexural slip faulting in the South Slough area (McInelly and Kelsey, 1990 #4102). The syncline is the location of numerous studies of subsidence-related deformation associated with the Cascadia subduction zone. Some of this deformation could be caused by localized folding and faulting during shallow upper-plate earthquakes (McNeill and others, 1998 #4089), but most of the subsidence is probably caused by regional or local

	deformation during very large subduction-zone earthquakes (McInelly and Kelsey, 1990 #4102; Nelson, 1992 #4277; Nelson and Personius, 1996 #4128; Nelson and others, 1998 #4197).
Length (km)	17 km.
Average strike	N7°W
Sense of movement	Syncline
Dip Direction	E; W *Comments:* The opposing fold limbs dip 35–75° into the axis of the syncline (Madin and others, 1995 #4158).
Paleoseismology studies	
Geomorphic expression	The axis of the South Slough syncline lies parallel to and controls the location of South Slough, an extensive north-trending wetland in the Coos Bay area of the central Oregon coast. The geologic and geomorphic expression of the syncline is asymmetric: the west limb consists of uniformly dipping Eocene bedrock which strongly controls topography and is broken by minor cross and bedding-parallel faults, and the east limb, which has numerous minor folds in bedrock and extensive cross and north-trending faults (Madin and others, 1995 #4158). The syncline and most of the active faults warp and offset an extensive flight of marine terrace platforms and sediments that ring the margins of South Slough (Griggs, 1945 #4153; Baldwin, 1966 #4122; McInelly and Kelsey, 1990 #4102; Madin and others, 1995 #4158).
Age of faulted surficial deposits	The syncline and most of the active faults warp and offset an extensive flight of marine terrace platforms and sediments that ring the margins of South Slough (Griggs, 1945 #4153; Baldwin, 1966 #4122; McInelly and Kelsey, 1990 #4102; Madin and others, 1995 #4158). These features include the Whisky Run, Pioneer, Seven Devils, and/or Metcalf marine terraces, which have assigned ages of about 80, 105, 125, and less than or equal to 200 ka, respectively (McInelly and Kelsey, 1990 #4102; Madin and others, 1995 #4158; Kelsey and others, 1996 #4111). Extensive coring studies of tidal marsh sediments have been used to document late Holocene regional subsidence. Several of the more prominent Holocene subsidence events recorded in South

	Slough tidal marsh sediments are likely related to regional subsidence related to very large earthquakes on the Cascadia subduction zone, but others may be related to local earthquakes associated with tightening of the South Slough syncline or movement on nearby faults (McInelly and Kelsey, 1990 #4102; Nelson, 1992 #4277; Nelson and Personius, 1996 #4128; McNeill and others, 1998 #4089; Nelson and others, 1998 #4197).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The South Slough syncline and most of the active faults warp and offset an extensive flight of marine terrace platforms and sediments that include the 80 ka Whiskey Run terrace, so these structures have been active in the late Quaternary (McInelly and Kelsey, 1990 #4102; Madin and others, 1995 #4158; Kelsey and others, 1996 #4111). One associated structure, the Barview fault, appears to have offset in the late Holocene (McInelly and Kelsey, 1990 #4102). Coring studies show evidence of repeated late Holocene subsidence (Nelson and others, 1998 #4197), but this deformation is probably caused by subduction zone deformation, as well as localized movement on the syncline and associated faults.
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* McInelly and Kelsey (1990 #4102) used deformed marine-terrace platforms to calculate horizontal strain rates of 0.044–0.13 ppm/yr and uplift rates of 0.5–0.8 mm/yr across folds in the Cape Arago/South Slough area. Slip rates as high as 0.73 mm/yr have been documented on some of the faults associated with the South Slough syncline (McInelly and Kelsey, 1990 #4102; Madin and others, 1995 #4158).
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
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