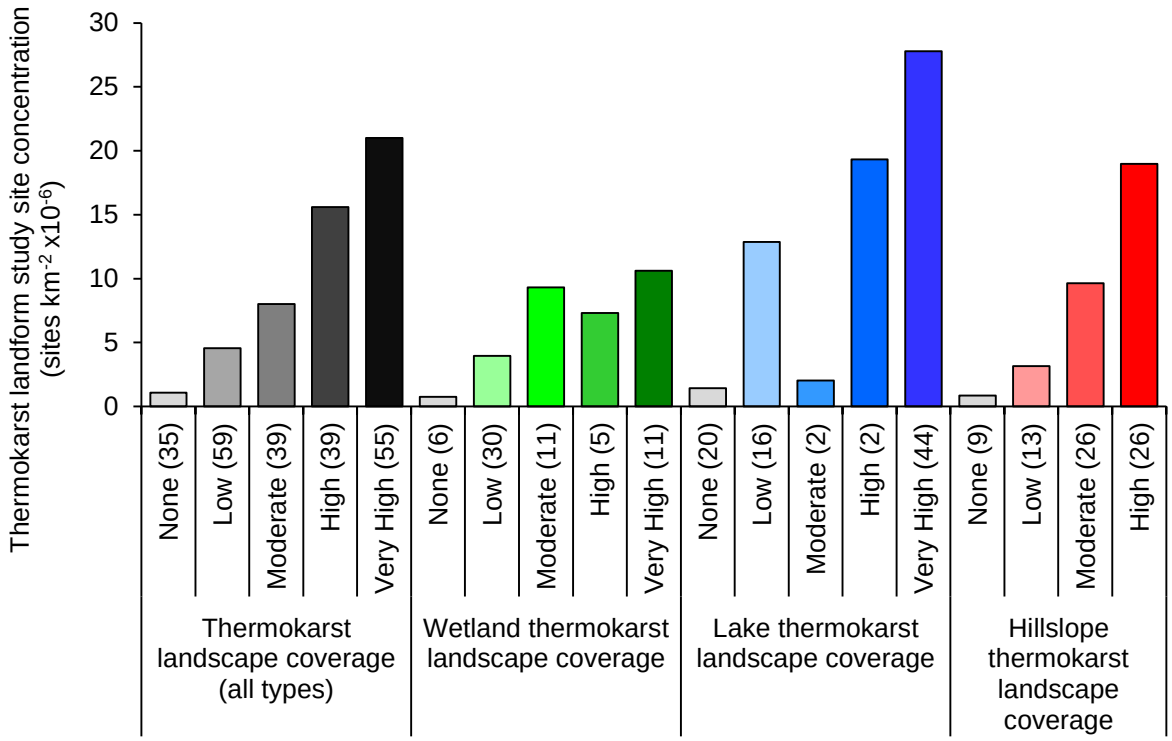
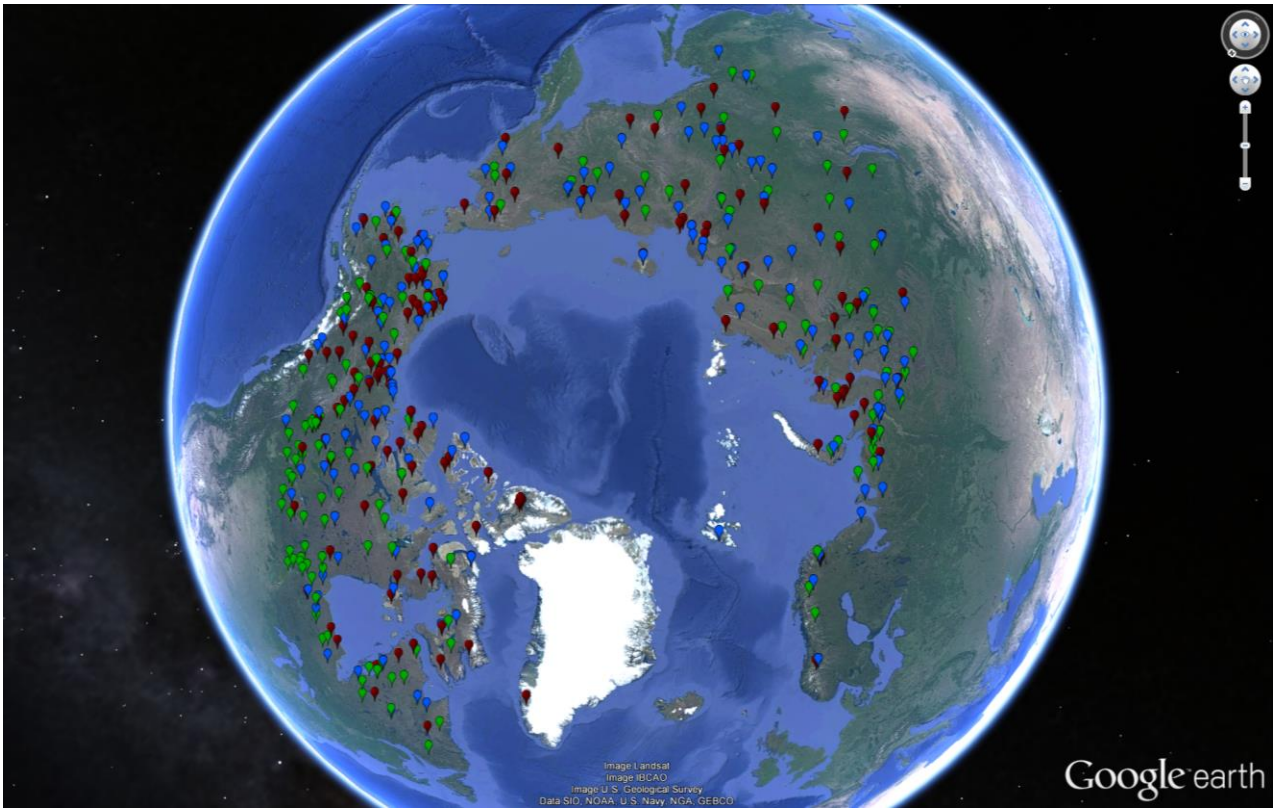
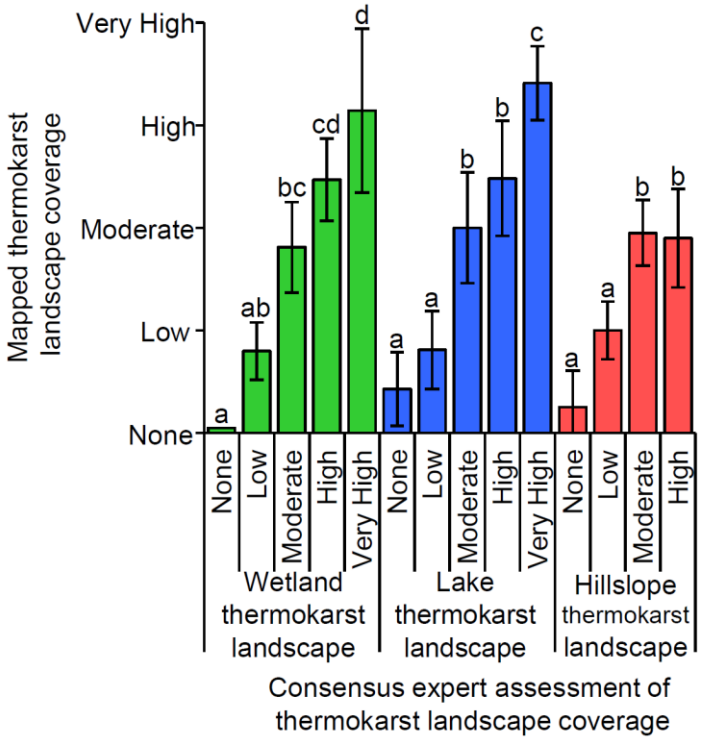


Supplementary Figure 1. Thermokarst study site concentrations in regions mapped with each coverage class. Numbers in brackets indicate the absolute number of study sites within each coverage class. Green, blue, and red shadings indicate site concentrations of wetland, lake and hillslope thermokarst landforms in each thermokarst landscape coverage class, grey shading indicate the overall thermokarst landform study site concentrations in different mapped coverage classes. Coverage is classified as "Very High" (60-100% regional coverage), "High" (30-60%), "Moderate" (10-30%), "Low" (1-10%) and "None" (0-1%).



Supplementary Figure 2. Stratified random sites used in the expert assessment of coverage of thermokarst landscapes. Locations of green circles were assessed for wetland thermokarst landscape coverage, blue circles for lake thermokarst landscape coverage, and red circles for hillslope thermokarst landscape coverage. Background map from Google Earth using data sources: Google, Landsat, IBCAO, USGS, NOAA, SIO, US Navy, GEBCO.



Supplementary Figure 3. Average mapped coverage of thermokarst landscapes (± 2 S.E.) for sites within each coverage class as indicated by the consensus expert assessment. Letters indicate significant differences ($p < 0.01$) between classes within each thermokarst landscape type, as indicated by an ANOVA followed by Tukey's HSD post-hoc test.

Supplementary Table 1. Confusion matrix for wetland thermokarst landscapes, comparing consensus expert assessment and mapped coverage of thermokarst landscapes. Numbers indicate the percent of total sites (150) in each bin.

		Expert assessment of coverage						
		None	*Low*	*Moderate*	*High*	*Very high*	**User Accuracy**	**Total Accuracy**
Mapped coverage	*None*	11 %	15 %	3 %	2 %	0 %	**36%**	
	Low	0 %	10 %	10 %	6 %	0 %	**38%**	
	Moderate	0 %	4 %	4 %	5 %	2 %	**27%**	
	High	0 %	1 %	3 %	9 %	0 %	**68%**	
	Very high	0 %	1 %	5 %	7 %	3 %	**17%**	
	Producer Accuracy	**100%**	**33%**	**16%**	**30%**	**57%**		**37%**

Supplementary Table 2. Confusion matrix for lake thermokarst landscapes, comparing consensus expert assessment and mapped coverage of thermokarst landscapes. Numbers indicate the per cent of total sites (150) in each bin.

		Expert assessment of coverage						
		None	*Low*	*Moderate*	*High*	*Very high*	**User Accuracy**	**Total Accuracy**
Mapped coverage	*None*	16 %	14 %	1 %	1 %	1 %	**48%**	
	Low	1 %	4 %	5 %	4 %	1 %	**26%**	
	Moderate	1 %	3 %	3 %	2 %	2 %	**24%**	
	High	1 %	2 %	3 %	4 %	4 %	**30%**	
	Very high	1 %	1 %	2 %	5 %	18 %	**68%**	
	Producer Accuracy	**80%**	**17%**	**20%**	**24%**	**69%**		**45%**

Supplementary Table 3. Confusion matrix for hillslope thermokarst landscapes, comparing consensus expert assessment and mapped coverage of thermokarst landscapes. Numbers indicate the per cent of total sites (135) in each bin.

		Expert assessment of coverage					
		None	*Low*	*Moderate*	*High*	**User Accuracy**	**Total Accuracy**
Mapped coverage	*None*	7 %	23 %	3 %	1 %	**21%**	
	Low	1 %	7 %	7 %	4 %	**39%**	
	Moderate	1 %	13 %	9 %	4 %	**32%**	
	High	0 %	5 %	11 %	5 %	**24%**	
	Producer Accuracy	**83%**	**14%**	**30%**	**37%**		**28%**

Supplementary Table 4. Database of study locations of thermokarst landforms characteristic of wetland thermokarst landscapes. Full reference list follows.

Reference	Latitude	Longitude	Mapped wetland thermokarst landscape coverage
Agafonov et al. 2004[1]	65.05	64.70	Moderate
Allard et al. 1996[2]	55.62	-77.18	Low
Backstrand et al. 2010[3]	68.35	19.03	None
Baltzer et al. 2014[4]	61.30	-121.3	Low
Bauer & Vitt 2011[5]	58.28	-119.37	Low
Beilman & Robinson 2003[6]	64.60	-124.20	High
Beilman & Robinson 2003[6]	62.30	-122.60	Very high
Beilman & Robinson 2003[6]	61.40	-121.81	Low
Beilman & Robinson 2003[6]	57.90	-116.10	Low
Beilman & Robinson 2003[6]	60.50	-120.70	Very high
Beilman & Robinson 2003[6]	55.10	-100.00	Low
Beilman & Robinson 2003[6]	55.80	-107.70	Low
Beilman & Robinson 2003[6]	56.50	-110.00	Low
Beilman & Robinson 2003[6]	57.80	-112.52	Very high
Beilman et al. 2001[7]	56.82	-105.96	Low
Beilman et al. 2001[7]	56.51	-97.00	Low
Blodau et al. 2008[8]	67.50	86.42	Low
Breton et al. 2009[9]	57.50	-76.23	Low
Bubier et al.1995[10]	55.68	-98.42	Moderate
Camill & Clark 1998[11]	54.63	-100.16	Low
Camill & Clark 1998[11]	56.42	-94.33	Moderate
Camill & Clark 1998[11]	55.69	-96.80	Very high
Camill 2005[12]	56.34	-94.71	Very high
Camill 2005[12]	55.73	-97.84	Low
Camill 2005[12]	54.91	-98.63	Low
Camill 2005[12]	54.89	-100.02	Low
Chasmer et al. 2010[13]	61.44	-121.25	Low
Couillard & Payette 1984[14]	58.22	-71.98	Low
Euskirchen et al. 2014[15]	64.70	-148.32	Moderate
Heikkinen et al. 2004[16]	67.38	63.37	High
Hugelius et al. 2011[17]	67.28	62.17	High
Jones et al. 2013[18]	64.68	-148.3	Moderate
Jorgensen 2000[19]	62.85	-143.68	Moderate
Jorgensen et al. 2013[20]	65.19	-156.64	Very high
Jorgensen et al. 2013[20]	63.57	-157.73	Very high
Jorgenson et al. 2001[21]	64.63	-147.70	Moderate
Jorgenson et al. 2001[21]	65.96	-148.41	Low

Supplementary Table 4. Continued.

Reference	Latitude	Longitude	Mapped wetland thermokarst landscape coverage
Kershaw & Gill 1979[22]	63.25	-130.03	None
Laberge & Payette 1995[23]	56.18	-75.92	None
Liblik et al. 1997[24]	61.80	-121.40	Moderate
Luken & Billings 1984[25]	64.87	-147.80	Moderate
Luoto & Seppälä 2003[26]	69.25	26.50	Low
Myers-Smith et al. 2007[27]	64.63	-148.27	High
Nykänen et al. 2003[28]	69.82	27.17	Low
Oberman 2008[29]	67.90	61.95	Moderate
Osterkamp et al. 2000[30]	62.40	-142.70	None
Prater et al. 2007[31]	59.48	-117.20	Very high
Quinton et al. 2009[32]	61.30	-121.30	Low
Sollid & Sorbel 1998[33]	62.10	9.41	None
Thibault & Payette 2009[34]	55.00	-78.00	Low
Thibault & Payette 2009[34]	53.28	-76.37	Low
Thibault & Payette 2009[34]	51.75	-75.00	Low
Thie 1974[35]	54.00	-98.50	Low
Turetsky et al. 2002[36]	55.85	-107.68	Low
Vallee & Payette 2007[37]	57.75	-76.33	Low
Vitt et al. 1994[38]	59.31	-118.94	Very high
Vitt et al. 1994[38]	59.94	-115.80	Very high
Vitt et al. 1994[38]	58.12	-111.81	Low
Vitt et al. 1994[38]	56.14	-98.40	Moderate
Yoshikawa et al. 2003[39]	64.70	-148.10	High
Zuidhoff 2002[40]	66.10	15.50	None

Supplementary Table 5. Database of study locations of thermokarst landforms characteristic of lake thermokarst landscapes. Full reference list follows.

Reference	Latitude	Longitude	Mapped lake thermokarst landscape coverage
Akerman 1992[41]	78.07	13.63	None
Allard et al. 1996[2]	55.62	-77.18	None
Are 1973[42]	62.12	133.45	None
Arp et al. 2011[43]	70.79	-153.07	Very high
Audrey et al. 2011[44]	65.82	75.17	Moderate
Billings & Peterson 1980[45]	71.33	-156.45	Very high
Black & Barksdale 1949[46]	70.50	-156.00	Very high
Blodau et al. 2008[8]	67.50	86.42	Low
Bosikov 1989[47]	61.58	130.67	Very high
Bouchard et al. 2011[48]	55.33	-77.50	None
Breton et al. 2009[9]	73.15	-79.97	None
Breton et al. 2009[9]	57.50	-76.23	None
Breton et al. 2009[9]	56.60	-76.20	None
Brouchkov et al. 2004[49]	62.00	130.20	Low
Burgess et al. 1982[50]	69.48	-134.58	Very high
Burn & Smith 1990[51]	63.58	-135.58	None
Burn 1998[52]	60.85	-135.67	None
Burn 2002[53]	69.47	-134.32	Very high
Dallimore et al. 2000[54]	69.43	-133.97	Very high
Desyatkin et al. 2009[55]	61.67	130.58	Very high
Dredge & Nixon 1979[56]	58.65	-93.80	High
Dyke & Sladen 2010[57]	57.30	-92.90	High
Flessa et al. 2008[58]	67.50	86.43	Low
Grosse et al. 2005[59]	71.78	129.39	Lone
Grosse et al. 2006[60]	73.57	117.30	Very high
Grosse et al. 2008[61]	71.78	129.39	None
Grosse et al. 2008[61]	72.92	123.01	Very high
Grosse et al. 2008[61]	68.76	161.42	Low
Heikkinen et al. 2004[16]	67.38	63.37	Very high
Hill & Solomons 1999[62]	69.72	-134.38	Very high
Hinkel et al. 2012[63]	70.50	-156.83	Very high
Hinkel et al. 2012[63]	70.00	-156.50	Very high
Hopkins 1949[64]	65.58	-163.17	Low
Johnson & Brown 1961[65]	68.30	-133.83	High
Jones et al. 2011[66]	66.50	-164.00	Very high
Jones et al. 2009[67]	70.42	-152.67	Very high
Jorgenson & Osterkamp 2005[68]	64.80	-148.00	None

Supplementary Table 5. Continued.

Reference	Latitude	Longitude	Mapped lake thermokarst landscape coverage
Jorgenson & Shur 2007[69]	70.25	-151.60	Very high
Kallio & Rieger 1969[70]	64.85	-147.85	None
Karlsson et al. 2012[71]	65.00	78.00	Low
Karlsson et al. 2012[71]	64.00	72.00	Very high
Karlsson et al. 2013[72]	65.00	75.00	Low
Katamura et al. 2006[73]	62.15	130.52	Low
Katamura et al. 2006[73]	63.12	130.60	Low
Labrecque et al. 2009[74]	68.00	-139.00	Very high
Lloyd et al. 2003[75]	64.83	-163.70	Low
Luoto & Seppälä 2003[26]	69.25	26.50	None
MacDonald et al. 2012[76]	68.12	-139.72	Very high
MacGraw 2008[77]	70.17	-150.91	Very high
Mackay & Burn 2011[78]	69.43	-124.88	Very high
Mackay 1987[79]	70.01	-129.87	Very high
Mackay 1999[80]	69.84	-131.42	Very high
Mars & Houseknecht 2007[81]	70.85	-153.83	Very high
Marsh 1990[82]	68.32	-133.79	High
Marsh et al. 2009[83]	69.93	-130.60	Very high
Morgenstern et al. 2011[84]	72.72	124.77	Very high
Morgenstern et al. 2011[84]	72.47	128.20	Very high
Morgenstern et al. 2008[85]	73.00	126.00	Very high
Necsoiu et al. 2013[86]	67.10	-158.55	Very high
Osterkamp et al. 2000[30]	64.50	148.90	None
Osterkamp et al. 2000[30]	64.90	147.70	None
Parsekian et al. 2011[87]	66.53	-164.33	Very high
Pelletier 2005[88]	70.50	-154.80	Very high
Pestryakova et al. 2012[89]	63.75	122.70	Very high
Pestryakova et al. 2012[89]	63.35	118.60	High
Plug & West 2009[90]	66.52	-164.48	Very high
Plug & West 2009[90]	68.95	-137.50	Very high
Raynolds et al. 2014[91]	70.28	-148.71	Very high
Riordan et al. 2006[92]	66.84	-149.11	None
Roach et al. 2011[93]	64.38	-158.68	None
Roach et al. 2011[93]	66.07	-149.07	Low
Roach et al. 2011[93]	66.18	-146.07	High
Roach et al. 2011[93]	63.02	-142.12	High
Sannel & Brown 2010[94]	57.88	-94.17	High
Sannel and Kuhry 2011[95]	58.88	-94.17	High
Sannel and Kuhry 2011[95]	67.27	62.13	Very high

Supplementary Table 5. Continued

Reference	Latitude	Longitude	Mapped lake terrain coverage
Sannel and Kuhry 2011[95]	68.47	20.90	Low
Schwamborn et al. 2002[96]	73.33	124.15	Very high
Shilo et al. 2007[97]	68.67	160.98	Very high
Sjöberg et al. 2013[98]	67.05	62.94	Low
Sjöberg et al. 2013[98]	67.16	61.88	Very high
Sjöberg et al. 2013[98]	67.28	62.17	Very high
Smith et al. 2005[99]	65.00	75.00	Low
Sollid & Sorbel 1998[33]	62.10	9.41	None
Stepanenko et al. 2011[100]	68.75	161.40	Low
Taylor et al. 2008[101]	69.25	-134.50	Very high
Tomirdiaro & Ryabchun 1973[102]	65.10	172.25	Moderate
Vallee & Payette 2007[37]	57.75	-76.33	None
van Hardenbroek et al. 2013[103]	70.80	147.60	Very high
Veremeeva & Gubin 2009[104]	69.50	156.00	Very high
Wallace 1948[105]	63.00	-142.00	High

Supplementary Table 6. Database of study locations of thermokarst landforms characteristic of hillslope thermokarst landscapes. Full reference list follows.

Reference	Latitude	Longitude	Mapped hillslope thermokarst landscape coverage
Astakhov & Isayeva 1988[106]	66.59	86.57	Moderate
Balser et al. 2009[107]	68.24	-158.16	Low
Balser et al. 2009[107]	68.02	-159.21	High
Balser et al. 2009[107]	68.04	-157.82	Low
Balser et al. 2014[108]	67.92	-156.85	Low
Belshe et al. 2013[109]	63.87	-149.25	Low
Biskaborn et al. 2013[110]	71.30	125.53	High
Burn & Zhang 2009[111]	69.57	-138.88	High
Burn 2000[112]	63.58	-135.58	None
Carter & Galloway 1981[113]	69.50	-151.95	High
Couture & Riopel 2008[114]	68.35	-133.72	Low
Dallimore et al. 2000[54]	69.43	-133.97	Moderate
Dallimore et al. 1996[115]	69.62	-131.26	Moderate
de Krom 1990[116]	69.59	-139.07	High
Deison et al. 2012[117]	68.50	-133.72	Moderate
Dredge et al. 1999[118]	67.63	-111.90	Low
Fedorov & Konstantinov 1998[119]	61.76	130.47	Moderate
Fortier et al. 2007[120]	73.17	-80.08	Moderate
French 1974[121]	72.68	-119.26	High
French 1975[122]	71.99	-125.23	High
Grosse et al. 2005[59]	71.78	129.39	None
Günther et al. 2012[123]	71.88	132.58	High
Günther et al. 2012[123]	71.42	132.10	High
Günther et al. 2012[123]	71.59	132.22	High
Hegginbottom 1978[124]	75.93	-107.90	High
Hyatt 1992[125]	66.15	-65.68	None
Jolivel & Allard 2013[126]	56.62	-76.53	Moderate
Kokelj et al. 2005[127]	68.97	-133.82	Moderate
Kokelj et al. 2005[127]	69.27	-134.58	Moderate
Kokelj et al. 2013[128]	67.32	-135.26	Moderate
Lacelle et al. 2010[129]	68.15	-135.58	None
Lantuit & Pollard 2008[130]	69.57	-139.08	High
Lantuit et al. 2012[131]	69.57	-138.92	High
Lantuit et al. 2012[131]	69.08	-137.90	Moderate
Lantz & Kokelj 2008[132]	69.03	-134.16	Moderate
Lantz et al. 2009[133]	69.55	-135.00	Moderate
Lantz et al. 2009[133]	68.27	-133.00	Moderate

Supplementary Table 6. Continued.

Reference	Latitude	Longitude	Mapped hillslope thermokarst landscape coverage
Lawson 1986[134]	69.79	-155.54	Moderate
Leibman 1995[135]	70.41	68.52	Moderate
Leibman et al. 2008[136]	69.75	62.00	Moderate
Lewellen 1970[137]	71.25	-156.70	Moderate
Lewkowicz 1987[138]	71.70	-124.03	High
Lewkowicz 1990[139]	79.97	-85.67	Low
Lewkowicz 1990[139]	79.97	-84.47	High
Lewkowicz 1990[139]	79.70	-84.38	High
Lewkowicz & Harris 2005a[140]	64.28	-124.67	Low
Lewkowicz & Harris 2005b[141]	65.03	-126.13	Moderate
Lewkowicz & Harris 2005b[141]	64.28	-124.47	Low
Lewkowicz & Harris 2005b[141]	79.98	-85.65	Low
Lewkowicz & Harris 2005b[141]	79.97	-84.30	High
Lewkowicz 2007[142]	79.70	-84.42	High
Liljedahl et al. 2007[143]	65.44	-164.58	High
Lipovsky & Huscroft 2006[144]	62.20	-133.37	None
Lyle et al. 2005[145]	62.17	-134.70	None
MacGraw 2008[77]	70.17	-150.91	High
Mackay 1970[146]	62.17	-134.70	None
Malone et al. 2013[147]	67.25	-135.22	Moderate
Mars & Houseknecht 2007[81]	70.85	-153.82	Moderate
McRoberts & Morgenstern 1974[148]	65.95	-128.67	None
McRoberts & Morgenstern 1974[148]	62.09	-122.01	None
Rudy et al. 2013[149]	74.90	-109.58	Low
Seppälä 1997[150]	62.10	-74.52	Low
Sidorchuk & Matveev 1994[151]	70.58	67.93	Moderate
Singhroy et al. 2010[152]	67.52	-130.79	Moderate
Smirnov 1986[153]	71.16	67.02	Moderate
Streletskyi et al. 2008[154]	69.00	-149.00	High
Toniolo et al. 2009[155]	65.17	-147.50	Moderate
Vogel et al. 2009[156]	63.88	-149.25	Low
Wang et al. 2009[157]	68.20	-132.75	Moderate

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