ᑐᓂᔭᐅᓯᒪᔪᑦ

ᓄᓇᕗᑦ ᐆᒪᔪᑕᕆᔅᓴᐃᑯᑦ ᑲᑎᒪᔨᖏᓐᓂᑦ

ᐃᒪᓇᐃᓘᖅᑕᐅᖁᓯᑦ

ᑐᓴᐅᒪᔪᑎᒃᓴᑦ: ᐃᓱᒪᓕᐅᕈᑎᑦ: X

ᐋᖅᑭᒃᑕᐅᔭᕆᐊᓕᒃ: ᑲᑎᓪᓗᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᓂᑦ ᐃᓱᒪᓕᐅᕈᑎᒋᔭᐅᔪᑦ ᐆᒍᖓ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ (Gulf of Boothia) ᓇᓄᕐᓄᑦ

ᐅᖃᐅᓯᖃᒃᓯᒪᓂᖏᑦ:

- ᐅᓇ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ (GB) ᓇᓄᐃᑦ ᑕᐅᕗᙱᐅᕙᒃᑐᑦ ᐊᐅᓚᑕᐅᔪᑦ ᓄᓇᕗᒥᑦ (ᐊᔾᔨᙳᐊᖅ 1). ᑭᖑᓪᓕᖅᐸᖅ ᖃᐅᔨᓴᖅᑕᐅᔾᔪᑎ ᐅᓄᕐᓂᖅᓯᓐᓄᑦ ᐱᓕᕆᐊᖑᓚᐅᕐᓯᒪᔪᖅ 1998-2000 ᐊᑯᓐᓂᖓᓂᒃ, ᐊᒻᒪᓗ ᖃᐅᔨᒍᑎᐅᓪᓗᓂ ᒫᓂ 1592-ᓂᑦ ᓇᓄᕐᑲᕐᓂᖓᓂᒃ. ᐅᕙᓂ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ (GB) ᓇᓄᐃᑦ ᐅᓄᕐᓂᖏᑦ ᓱᕐᑯᓯᕐᓯᒪᓗᐊᓚᐅᕐᓯᒪᙱᑦᑐᑦ 2000-ᒥᑦ ᐅᕝᕙᓘᓐᓃᑦ ᐅᓄᕐᓯᕙᓪᓕᐊᒐᓱᒋᔭᐅᓪᓗᑎᒃ.
- ᓄᓇᓕᐅᔪᑦ ᐅᑯᓇᓂ ᐃᒡᓗᓕᒃ, ᓴᓂᕋᔭᒃ, ᑕᓗᕐᔪᐊᖅ, ᐅᖅᓱᖅᑑᖅ, ᐊᒻᒪ ᑰᒑᕈᒃᒥᐅᑕ ᓇᓄᓂᐅᓯᖅᑦᑕᖅᑐᑦ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ. ᒫᓇ ᑲᑎᓪᓗᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᑦ (TAH) ᐃᑦᓯᐊᖅᑐᖅᕕᒃᑯᑦ 74 ᓇᓄᐃᑦ ᐊᕐᕌᒍᒥᑦ. ᓇᓄᐃᑦ ᐱᔭᐅᔪᓐᓇᕐᑐᑦ ᐅᑯᐊ ᐊᑯᓐᓂᖓᓂᒃ 2004/2005 ᐊᒻᒪ 2018/2019 63-ᓂ ᓇᓄᒍᓇᓚᐅᕐᓯᒪᔪᑦ ᐊᕐᕌᒍᒥᑦ (ᐊᔾᔨᙳᐊᖅ 2). ᐅᓄᙵᓂᖕᓴᐅᔾᔪᑎᑦ ᑲᑎᓪᓗᑎᒃ ᐱᔭᐅᔪᓐᓇᕐᑐᑦ ᐋᖅᑭᒃᑕᐅᓯᒪᔪᒃᓴᐅᔪᖅ ᓄᓇᓕᖕᓂ ᐊᐅᓚᑦᑎᓂᒃᑯᑦ, ᑖᓐᓇᓕ ᓄᖅᑲᖅᑎᑕᐅᖃᑦᑕᓚᐅᕐᑐᖅ ᐊᕐᓇᕐᓗᐃᑦ ᐱᔭᐅᔪᓐᓇᕐᓂᖏᑦ ᐅᕙᓂ 2:1 ᐊᖑᓴᓪᓗᖕᓂ ᒪᕐᕉᖕᓂ ᐊᕐᓇᕐᓗᖕᓂ ᐊᑕᐅᓯᕐᒥ ᐱᔪᓐᓇᖅᓱᑎᒃ ᐊᒻᒪ ᑕᐃᒪᐃᑎᑕᐅᓂᑰᓪᓗᓂ ᐊᕐᓇᕐᓗᖕᓂ ᐱᓗᐊᑲᑕᓪᓕᕐᔭᕆᐊᒃᓴᖏᓐᓂᒃ ᐊᒻᒪ ᐱᔭᐅᔪᓐᓇᕐᑐᓂᒃ ᐅᓄᕈᓐᓃᖅᐸᓪᓕᕈᑎᐅᓗᓂ, ᐊᒻᒪᓗ ᓯᑯ ᐱᐅᙱᓐᓂᖓᓄᑦ ᐊᖑᓇᓱᙵᙱᓐᓂᖕᓴᐅᕙᒃᐳᑎᒃ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ ᐊᖑᓇᓱᒋᐊᖅᐸᒃᑐᓄᑦ.
- ᐅᓄᕐᓂᕆᔭᐅᔪᑦ ᑲᑎᑕᐅᓯᒪᔪᑦ ᓄᑕᐅᙱᓗᐊᓚᐅᕐᒪᑕ, ᐊᒻᒪᓗ ᓄᑖᓂᒃ ᖃᐅᔨᓴᕆᐊᖃᓚᐅᕐᓗᑎᒃ ᖃᔅᓯᐅᓂᖏᓐᓄᑦ ᑕᒪᐅᙱᖅᐸᒃᑐᑦ ᓇᓄᐃᑦ. ᓄᓇᓕᖕᓂ ᐅᖃᓪᓚᖃᑎᖃᓚᐅᕐᓯᒪᑎᓪᓗᑎᑦ 2012 ᐊᒻᒪ 2013-ᒥᑦ, ᓄᑖᒥ ᐊᕐᕌᒍᓂ ᐱᖓᓱᓂ ᖃᐅᔨᓴᕐᓂᕐᒥᒃ 2015-ᒥᑦ ᐱᒋᐊᓕᓚᐅᕐᓯᒪᔪᑦ. ᐊᑐᖅᑕᐅᓚᐅᕐᑐᑦᓕ ᖃᐅᔨᓴᕐᓂᕐᒧᑦ ᐸᖅᕕᓵᓇᓐᓇᙱᓐᓂᖕᓴᒥᑦ ᖃᓄᐃᑦᑑᓂᖏᓐᓂᒃ (DNA) ᖃᐅᔨᓴᖅᑕᐅᔫᒃᓴᓕᓇᓪᓗᑎᒃ. ᐅᓇ ᓄᑖᖅ ᖃᐅᔨᓴᕐᓂᖅ ᐱᓕᕆᐊᖑᓚᐅᕐᑐᖅ 2015-ᓗ 2017-ᓗ ᐊᑯᓐᓂᖓᓂ.
- ᓄᓇᕗᒥᑦ ᒐᕙᒪᒃᑯᑦ, ᐊᕙᑎᓕᕆᔨᒃᑯᑦ (DOE) ᓯᕗᓂᐊᒍᑦ ᐸᕐᓇᒃᓯᒪᓚᐅᕐᓯᒪᔪᑦ ᓄᓇᓕᖕᓂ ᐱᓕᕆᓂᐅᓗᓂ ᑲᑎᕐᓯᐃᕙᓪᓕᐊᓂᒃᑯᑦ ᓄᓇᓕᖕᓂ ᖃᐅᔨᒪᔭᐅᔪᑐᖅᑲᕐᓂᒃ ᐅᑯᓇᙵ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᐅᐸ ᖃᓂᒋᔭᖓᓂ ᓄᓇᓕᖕᓂᑦ ᐊᒻᒪ ᐊᖑᓇᓱᒃᑎᓂᒃ. ᑭᓯᐊᓂᓕ, ᐅᓇ ᓄᕙᒡᔪᐊᕐᓇᖅ-19 ᐋᓐᓂᐊᕕᒡᔪᐊᕐᓇᖅ ᐊᔪᕈᑎᒋᔭᐅᓚᐅᕐᑐᖅ ᓄᓇᓕᖕᓂ ᐅᐸᒃᑕᒡᓗᓂ ᐊᐱᕐᓯᒃᑕᒋᐊᒃᓴᖅ 2020-ᒥᑦ. ᑕᐃᒪᐃᓐᓂᖓᓄᑦ, ᖃᐅᔨᓴᕐᓂᖅ ᐱᓕᕆᐊᖑᔭᕆᐊᖅᑲᓕᓚᐅᕐᑐᖅ ᐃᓄᖅᑲᙱᑦᑐᓂᒃ ᐊᒻᒪᓗ ᑲᔪᓯᓪᓗᓂ ᔭᓄᐊᕆ 2021-ᒥᑦ.

ᒫᓐᓇᐅᔪᖅ ᖃᓄᐃᓕᖓᓕᕐᓂᖓ:

- ᑭᖑᓪᓕᖅᐸᑦ ᐅᓂᒃᑳᑦ ᐊᒻᒪ ᖃᐅᔨᒍᑎᐅᔪᑦ 2015-2017 ᖃᐅᔨᓴᕐᓂᕐᒥᒃ ᐱᐊᓂᒃᑕᐅᓚᐅᖓᔪᖅ ᐊᒻᒪᓗ ᑐᓂᐅᖃᖅᑕᐅᓪᓗᑎᒃ ᑕᒪᑐᒎᓚ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᓕᕆᖅᑕᐅᔪᓂᒃ 2020 ᐊᐅᔾᔭᖓ. ᐅᓇ ᐅᓄᕐᓂᖏᓐᓄᑦ ᐃᓱᒪᒋᔭᐅᔪᖅ ᒫᓐᓇᓂᖏᓐᓂᒃ 1525 ᓇᓄᐃᑦ ᖃᐅᔨᓴᖅᑐᓕᕆᓂᒃᑯᑦ ᐊᓯᑦᑐᐊᙳᑎᑕᖓ ᐅᓄᖕᓂᖏᓐᓄᑦ ᐃᓱᒪᒋᔭᐅᓚᐅᕐᓯᒪᔪᒥᒃ ᐃᒪᓐᓇ 1592 (1998-2000).
- ᐅᑯᐊ ᓄᓖᑦ ᖃᐅᔨᔭᐅᒍᑏᑦ ᑖᒥᓃᑦᑐᑦ ᓇᓄᐃᑦ ᓈᒻᒪᖕᓂᖏᓐᓂᒃ ᐊᒻᒪᓗ ᐅᓄᕐᓯᒃᑲᓐᓂᕈᓐᓇᕐᓂᐊᖅᓱᑎᒃ. ᒪᑯᓄᖓ ᐊᑎᑦᑕᓛᓄᑦ ᐊᖏᑎᒋᓂᖏᑦᑎᒍᑦ ᐅᑯᓇᓂ 2015-2017 ᒫᓂᓚᐅᕐᑐᑦ 1.61 (95% ᐱᑕᖃᑦᑎᐊᕐᓂᖏᑦᑎᒍᑦ [CI] = 1.51 – 1.70) ᐊᒻᒪ 1.53 (95% CI = 1.41 – 1.64), ᖃᐅᔨᓴᖅᑕᐅᓪᓗᑎᒃ ᓯᕗᓂᐊᒍᑦ ᖃᐅᔨᒋᐊᕈᑎᖃᕐᑎ ᐅᑯᐊ ᐊᓯᐊᒍᑦ 1998-2000.
- ᑎᒥᖏᓐᓄᑦ ᑕᐅᑦᑐᕆᔭᐅᔪᑦ ᓇᓄᕐᓂ ᐅᐱᙱᒃᑯᑦ ᐊᖏᓪᓕᕚᓪᓕᕐᓯᒪᔪᑦ ᐅᑯᐊ ᐊᑯᓐᓂᖓᓂᒃ 1998-2000 ᐊᒻᒪᓗ 2015-2017, ᑕᒪᓐᓇᓗ ᓯᑰᑉ ᖃᓄᐃᓕᖓᓂᖓ ᐊᓯᙳᖅᐸᓪᓕᐊᓂᖓᓄᑦ (ᓱᕐᓗ ᒥᒃᓕᕚᓪᓕᕐᓂᖏᓐᓂᒃ ᓯᑯᖅᑲᐃᕐ) ᖃᐅᔨᓴᕐᕕᐅᔪᒥᑦ. ᐊᓯᔾᔨᕈᑎᐅᔪᑦ ᓯᑯᖅᑳᕐᓂᒃ ᐱᑕᖃᕆᐊᓖᕐᓂᕐᓴᐅᔪᓄᑦ ᐊᒻᒪᓗ ᐊᕐᕌᒍᑦ ᓯᑯᑦᑕᖃᕐᓂᕐᓴᐅᓂᖓᓄᑦ ᓇᓄᕐᓂ ᓂᕆᔭᒃᓴᖏᓐᓂᒃ ᐱᔪᓇᕐᓂᕐᓴᐅᒍᑎᐅᓇᓱᒋᔭᐅᔪᖅ.
- ᐱᔾᔪᑎᒋᓪᓗᒍ ᓇᓗᙳᐅᕙᓪᓕᐊᓂᖏᓐᓄᑦ ᑲᑎᑕᐅᕙᓪᓕᐊᔪᑦ ᐱᑕᖃᙱᓗᐊᕐᓂᖏᓐᓂᒃ (ᓱᕐᓗ ᓂᐱᓕᐅᕐᓯᒪᓂᒃᑯᑦ/ᐅᖓᓯᒌᖕᓂᕐᒧ) ᑕᐃᒪᓕ ᐊᔪᕐᓇᖅᑐᕈᓘᖕᒪᑦ ᓇᓗᓇᐃᕆᐊᒃᓴᖅ ᖃᔅᓯᐅᔪᕆᐊᒃᓴᖕᒋᓐᓂ ᑕᐅᙳᖅᐸᓪᓕᐊᔪᑦ ᐊᒻᒪ ᑖᓂᒍᓐᓃᖅᓴᒪᔪᑦ ᒫᓂ ᐃᑦᓱᐊᖅᑐᖅᕕᒃᐅᓪᓗ (GB) ᐊᒻᒪ ᐊᓯᐊᓃᑦᑐᑦ ᓇᓄᐃᑦ. ᐱᑕᖃᕋᓗᐊᕐᑎᓪᓗᒍ ᑕᐅᙳᖅᐸᒃᑐᑦ ᐃᓂᑦᑎᕙᒃᑕᖏᑦ, ᓇᓄᐃᑦ ᐊᓯᐊᓂᒃ ᓄᓇᒦᑦᑐᑦ ᐅᑎᖅᑕᕋᐅᔭᖃᑦᑕᖅᑐᒃᓴᐅᕙᑕ ᐃᓂᒋᔭᐅᔪᑦ ᐊᑯᓐᓂᖏᑦᑎᒍᑦ ᖃᓄᐃᓕᖓᓕᕐᓂᖓᓄᑦ ᓱᓚᐅᒃ. ᐅᓄᕐᓂᖏᓐᓄᑦ ᐃᓱᒪᒋᔭᐅᔪᖅ ᓴᖅᑭᑎᑦᑎᓯᒪᔪᖅ "ᐅᓄᓖᒃᑯᑦ" (ᓱᕐᓗ, ᐃᓚᐅᑎᑦᑎᓯᒪᔪᖅ ᑕᒪᐃᓐᓂ ᓇᓄᕐᓂᒃ ᐃᑦᓱᐊᖅᑐᖅᕕᒃᒥᑦ ᐊᐅᓚᑦᑎᕕᐅᔪᒥᑦ).
- ᐅᓇ ᑲᑎᒍᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᑦ (TAH) 74 ᐅᓄᕐᓂᐅᔪᖅ ᐋᖅᑭᐊᖅᑕᐅᓯᒪᙱᑦᑐᖅ ᑕᐅᙳᖅᐸᒃᑐᓄᑦ ᓇᓄᕐᓄᑦ ᐊᕐᕌᒎᓕᕐᑐᓂᒃ ᖁᓕᓂᒃ ᓇᓄᓕᓯᓐᓇᐅᑎᓪᓗᒍ. ᓇᓄᐃᑦ ᐱᔭᐅᔪᓐᓇᖅᑕᑦᓯᒪᔪᑦ ᐊᕐᕌᒎᓕᕐᑐᓂᒃ ᑕᓪᓕᒪᓂᒃ ᒫᓯᒪᔪᖅ 64-ᓂ ᓇᓐᓄᒍᓐᓇᖅᓱᑎᒃ (ᐊᔾᔨᙳᐊᖅ 2).

ᐊᐱᖅᓱᕐᓃᑦ:

- ᐅᐸᑦᑕᑎᒌᖕᓂᒃᑯᑦ ᓄᓇᓕᖕᓂ ᖃᐅᔨᓇᓱᒃᑕᓚᐅᕐᑐᑦ ᒪᑯᓂᖓ ᑭᒡᒐᖅᑐᐃᔨᐅᔪᓂᒃ ᐃᑦᓱᐊᖅᑐᖅᕕᒃᒧᑦ ᐊᖑᓇᓱᒃᑐᓕᕆᔨᒃᑯᓐᓂᒃ (HTO) ᐅᒃᑑᐱᕆ 20-ᒧ 28-ᒧ ᐊᑯᓐᓂᖓᓂᒃ 2020.
- ᐊᖏᖃᑎᒌᖕᓂᕐᑕᖃᓚᐅᕐᑐᖅ ᐊᖑᓇᓱᒃᑐᓕᕆᔨᓄᑦ ᐅᑯᓂᖓ ᖃᐅᔨᔭᐅᓯᒪᔪᓄᑦ ᓄᓇᕗᒥᑦ ᒐᕙᒪᒃᑯᑦ ᐅᓂᒃᑳᖏᓐᓂᒃ, ᐃᓚᖏᓪᓕ ᐊᖑᓇᓱᒃᑐᓕᕆᔨᓄᑦ ᐃᓕᑦᓯᔪᑦ ᐊᐱᕆᓚᐅᕐᓱᑎᒃ ᖃᓄᖅ ᐅᓄᒃᑲᓐᓂᕐᑐᓂᒃ ᓂᕕᙵᑕᖅᑖᕈᓐᓇᕐᒪᖔᑕ.
- ᑕᐃᒪᐃᓐᓂᐸᓗᒃ ᐊᖑᓇᓱᒃᑐᓕᕆᔨᐅᔪᑦ ᐃᓱᒫᓗᑎᖃᓚᐅᕐᑐᑦ ᐊᖑᓇᓱᒃᑐᓕᕆᔨᒃᑯᑦ ᓂᕕᙵᑕᖅᑖᖅᑎᕙᖕᓂᖏᓐᓂᒃ ᑕᒪᓐᓇᓗ ᕿᒥᕐᕈᐊᖅᑕᐅᒃᑲᓂᖁᔭᐅᓪᓗᓂ ᐊᔾᔨᒌᒃᑎᑦᑎᓂᖅ ᐊᒻᒪ ᓇᓕᒧᕆᒃᑎᑦᑎᓂᖅ ᐊᑐᖅᑕᐅᒐᓗᐊᕐᒪᖔᑦ ᓄᓇᓕᖕᓂ ᐊᖑᓇᓯᑭᐊᖅᐸᒃᑐᓂᑦ ᐃᑦᓱᐊᖅᑐᖅᕕᒃᒥᑦ ᓇᓄᕐᓂ.
- ᐃᖅᑲᓇᐃᔭᖅᑎᑦᑎᔨᐅᔪᑦ ᐅᑯᓇᙵᑦ ᓄᓇᕗᑦ ᑐᙵᕕᒃ (NTI), ᓄᓇᕗᒥ ᐆᒪᔪᓕᕆᔨᑦᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ (NWMB), ᕿᑎᕐᒥᐅᑦ ᐆᒪᔪᓕᕆᔨᑦᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ (KRWB), ᐊᒻᒪᓗ ᕿᑭᖅᑖᓗᒃᒥᑦ ᐆᒪᔪᓕᕆᔨᑦᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ (QWB) ᐊᑐᐃᓐᓇᐅᓚᐅᕐᒥᔪᑦ ᑲᑎᒪᔪᓂ ᐅᐸᒃᑕᒃᓱᒍᑎᒃ (ᑕᑯᓗᒍ ᓇᓗᓇᐃᔭᕐᓯᒪᔪᑦ ᐅᕙᓂ ᐃᑦᓱᐊᖅᑐᖅᕕᒃᒥᑦ ᖃᐅᔨᓇᓱᖕᓂᕐᒧᑦ ᐅᓂᒃᑳᓂᒃ ᐅᑯᓇᙵᑦ ᓄᓇᕗᒥᑦ ᒐᕙᒪᒃᑯᑦ ᐊᕙᑎᓕᕆᔨᖏᓐᓂᒃ).
- ᑭᕙᓪᓕᕐᒥᑦ ᐆᒪᔪᓕᕆᔨᑦᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ (KWB) ᐅᐸᒍᑎᔪᓐᓇᓚᐅᙱᑦᑐᑦ.

ᐊᑐᓕᕐᑯᔭᐅᔪᑦ:

1. ᐊᕙᑎᓕᕆᔨᒃᑯᑦ (DOE) ᐃᓱᒪᓕᐅᕆᔪᑦ **ᐊᓯᙳᖅᑎᑕᐅᙱᑦᑐᓂ ᒫᓐᓇ ᑲᑎᖓᑎᒃ ᐱᔭᐅᔪᓐᓇᕐᑐᑦ ᐅᓄᕐᓂᖏᑦ (TAH) 74 ᓇᓄᐃᑦ ᐃᒻᒪᓐᓇ 1:1 ᐊᑕᐅᓯᖅ ᐊᖑᓴᑦᑐᖅ ᐱᔭᐅᔪᖅ ᓇᓕᒧᑦᑐᒍ ᐊᑕᐅᓯᕐᒥ ᐊᕐᓇᕐᑐᖕᒥ ᐱᔪᓐᓇᕐᓂᕐᒧᑦ.**

ᐱᔾᔪᑎᖏᑦ:

a. ᐃᓱᒪᓕᐊᓇᔭᐅᔪᖅ ᑲᑎᖓᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᑦ (TAH) ᐃᓱᒪᒋᔭᖃᕐᓂᒃᑯᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᓕᕆᐊᓄᑦ ᑕᒪᒃᑯᐊ ᓇᓄᐃᑦ ᐅᓄᕐᓂᖏ ᓈᒻᒪᒐᓱᒃᑐᒋᑦ. ᖃᐅᔨᓴᕈᑎᕕᓃᑦ ᓴᖅᑭᑎᑦᑎᓯᒪᓕᔪᑦ ᐅᓄᕐᓂᓇᔭᐅᔪᑦ ᓱᕈᓯᒧᐊᕐᓯᒪᙱᓐᓂᖏᓐᓂᒃ ᐅᓇ ᐊᑐᖅᑕᐅᑦᑐᓂ 74-ᓂ ᓇᓐᓄᒧᓐᓇᕐᓂᖅ ᐅᕘᓇ ᑲᑎᖓᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᑎᒍᑦ (TAH).

b. ᐃᓱᒪᓕᐊᓇᔭᐅᔪᖅ ᐃᓱᒪᒋᔭᖃᕈᑎᐅᖕᒥᔪᖅ ᐊᓯᙳᖅᐸᓪᓕᐊᓂᖓ ᓄᓇᐅᑉ ᖃᓄᐃᑉᐸᓪᓕᐊᒍᑎᓄᑦ, ᐊᒻᒪᓗ ᐅᑯᐊ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ ᓇᓄᐃᑦ ᐃᓚᒋᔭᐅᒻᒪᕆᒃᑐᑎᒃ. ᓄᓇᐅᑉ ᖃᓄᐃᑉᐸᓪᓕᐊᓂᖓ ᐊᓯᔾᔨᖅᐸᓪᓕᐊᖏᓐᓇᐅᔭᕐᒪᑦ ᓯᓚᐅᑉ ᐊᓯᙳᖅᐸᓪᓕᐊᓂᖓᓄᑦ ᐊᒻᒪᓗ ᐊᑯᓂᕈᓗᒃ ᐊᒃᑐᐃᒍᑎᐅᔪᓐᓇᖅᑐᓄᑦ, ᑕᒪᒃᑯᐊ ᐊᓯᙳᖅᐸᓪᓕᐊᒍᑎ ᑭᓯᒧᑦ ᓇᓗᓇᖅᑐᒥᒃ.

c. ᐋᖅᑭᒃᓯᐃᓂᖅ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥ ᓇᓐᓄᒃᑕᐅᔪᓐᓇᖅᑐᑦ ᒫᓐᓇ ᖁᕝᕙᓕᐊᖅᑕᐅᒃᐸᑕ ᐅᑐᓕᐊᓇᓕᔭᐅᖕᒪ ᐅᓄᕈᓐᓃᑐᐊᕋᔭᕐᓂᖏᓐᓂᒃ, ᒫᓂᑐᐃᓐᓇᐅᙱᑦᑐᖅ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ ᑭᓯᐊᓂᓕ ᖃᓂᒋᔭᖕᖓᓂ ᓇᓄᕐᓂ ᒪᑯᓄᖕᖓ ᐊᓯᐊᓄᐊᖅᐸᓪᓕᐊᓂᕐᒧ/ᑕᒪᐅᙵᖅᐸᓪᓕᐊᔪᑦ ᐅᓄᕐᓂᖏᓐᓄᑦ.

d. ᐅᓇ ᑲᑎᖓᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᑦ (TAH) 74 ᐅᓄᕐᓂᐅᔪᖅ ᐋᖅᑭᒋᐊᖅᑕᐅᓯᒪᙱᑦᑐᖅ ᑕᒪᐅᙵᖅᐸᒃᑐᓄᑦ ᓇᓄᕐᓄᑦ ᐊᕐᕌᒎᓕᕐᑐᓂᒃ ᖁᓕᓂᒃ ᓇᓐᓄᕋᓱᖕᓇᐅᑎᑦᑐᒍ. ᐊᕐᕌᒎᓕᕐᑐᓂᒃ ᑕᑦᑕᓕᒪᓂᒃ ᓇᓐᓄᒃᑕᐅᔪᓐᓇᖅᑐᑦ ᒫᓃᓯᒪᔪᖅ 64-ᓂ ᓇᓐᓄᒧᓐᓇᖅᑐᑎᒃ.

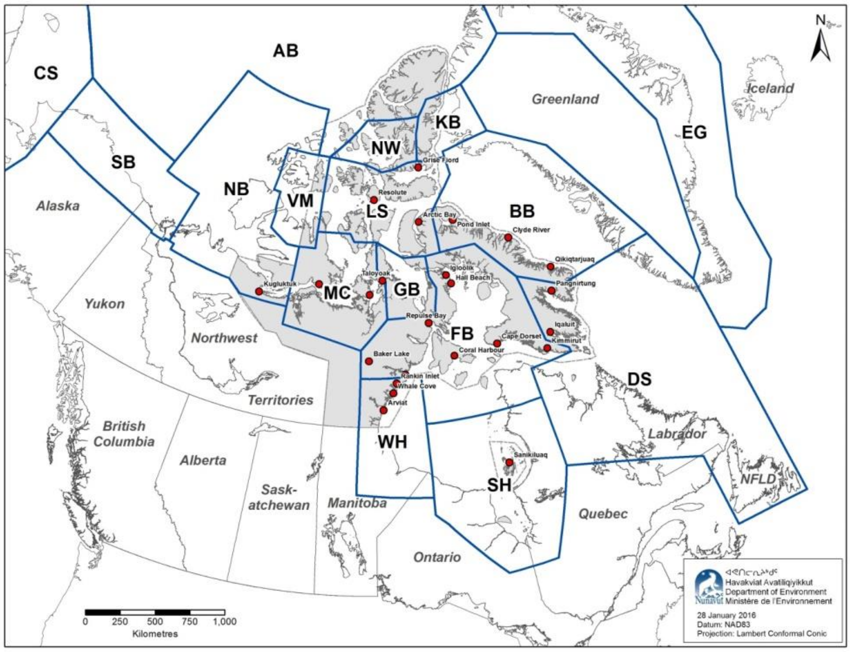
2. ᐊᕙᑎᓕᕆᔨᒃᑯᑦ (DOE) ᐃᓱᒪᓕᐅᕆᓚᐅᕐᑐᑦ ᑕᒪᒃᑯᐊ ᐱᓕᕆᐊᖃᖅᑐᓕᒫᑦ ᐊᕕᒃᑐᕐᓯᒪᓂᒃᑯᑦ ᐆᒪᔪᓕᕆᔨᕐᔪᐊᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑦ ᐅᖃᓪᓚᖃᑎᖃᖅᓗᑎᒃ ᐃᑦᓯᐊᖅᑐᖅᕕᒃᒥᑦ ᓇᓐᓄᒃᑕᐅᔪᓐᓇᖅᑐᓄᑦ ᓂᕕᙵᓚᑕᒃᓴᐃᑦ ᐊᕕᒃᑐᖅᑕᐅᓂᖓᓂᒃ ᓄᓇᓕᖕᓂ ᐊᒃᑐᖅᑕᐅᓯᒪᔪᓂᒃ, ᐃᓚᖃᖅᑐᓂ ᓇᓐᓄᒃᑕᐅᔪᓐᓇᖅᑐᑦ ᒫᓂ ᖃᖅᑭᐅᔭᕐᒥᑦ (M’Clintock Channel [MC]) ᓇᓄᐃᑦ.

ᐱᔾᔪᑎᖏᑦ:

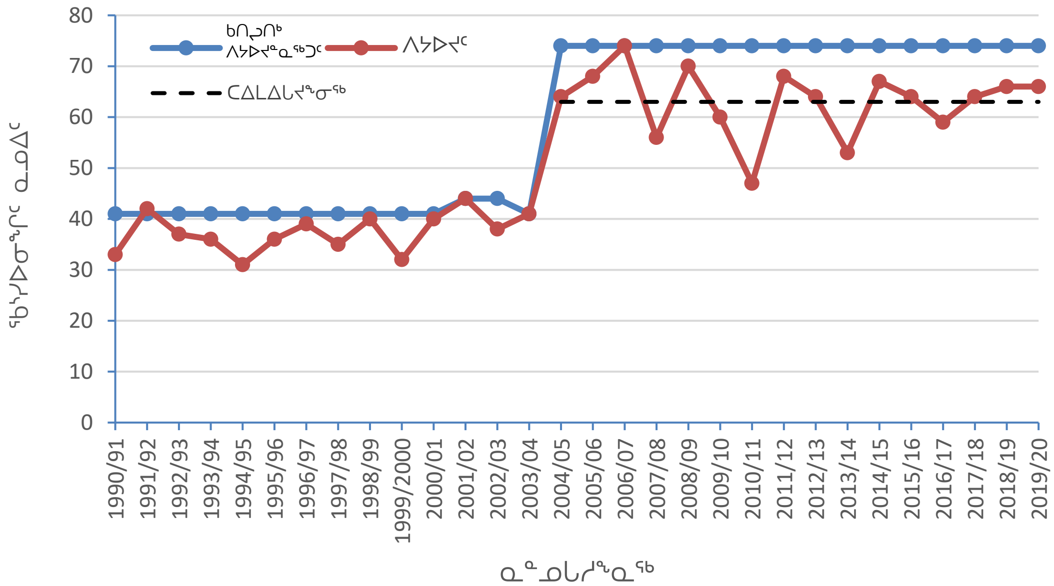
a. ᐅᖃᖅᑲᑎᖅᑲᖅᓂᒃᑯᑦ ᑲᑎᒪᑎᓪᓗᒋᑦ (ᐅᒃᑑᐱᕆ 19-21,2020) ᐊᔾᔨᐸᓗᖕᒋᓐᓂᒃ ᐃᓱᒫᓗᑎᖅᑲᓚᐅᕐᑐᑦ ᐊᑐᓂ ᓄᓇᓕᐅᔪᑦ ᐆᒥᖕᒐ ᒫᓐᓇ ᓂᕕᙵᓪᓚᑦᓴᖅᑖᖅᑎᑦᑎᕙᖕᓂᕐᒥ ᐃᑦᓯᐊᖅᑐᖅᕕᐅᑉ ᖃᓂᒋᔭᖕᖓᓂᑦᑐᓄᑦ ᓄᓇᓕᖕᓄ ᐋᖅᑭᒃᓯᖅᑕᐅᒃᑲᓐᓂᕆᐊᖅᑲᖅᓂᖕᖓᓂᒃ ᐊᒻᒪᓗ ᐱᔭᐅᔪᓐᓇᖅᑐᓕᕆᓂᖅ.

b. ᐅᓇ ᑲᑎᖓᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᑦ (TAH) 74 ᐅᓄᕐᓂᐅᔪᖅ ᐋᖅᑭᒋᐊᖅᑕᐅᓯᒪᙱᑦᑐᖅ ᑕᒪᐅᙵᖅᐸᒃᑐᓄᑦ ᓇᓄᕐᓄᑦ ᐊᕐᕌᒎᓕᕐᑐᓂᒃ ᖁᓕᓂᒃ ᓇᓐᓄᕋᓱᖕᓇᐅᑎᑦᑐᒍ. ᐊᕐᕌᒎᓕᕐᑐᓂᒃ ᑕᑦᑕᓕᒪᓂᒃ ᓇᓐᓄᒃᑕᐅᔪᓐᓇᖅᑐᑦ ᒫᓃᓯᒪᔪᖅ 64-ᓂ ᓇᓐᓄᒧᓐᓇᖅᑐᑎᒃ.

ᐃᓚᓕᐅᔾᔪᐅᓯᒪᔪᖅ 1



ᐊᔾᔨᖑᐊᖅ 1. ᕿᒥᕐᕈᐊᕐᓂᖅ ᓄᓇᕗᒥᑦ ᓇᓄᐃᑦ ᐅᓄᕐᓂᖕᑎᓐᓂᒃ (GB = ᐃᑦᓯᐊᖅᑐᖅᕕᒃ, MC = ᖃᒃᑎᐅᔭᖅ).



ᐊᔾᔨᙳᐊᖅ 2. ᕿᒥᕐᕈᐊᕐᓂᖅ ᐃᑦᓱᐊᖅᑐᖅᑲᐅᒃ ᓇᓄᖏᑦ ᑲᑎᖅᑎᒃ ᐱᔭᐅᔪᓐᓇᖅᑐᑦ (TAH), ᐱᓪᓚᕆᐅᓂᒃᑯᑦ ᐊᒻᒪ ᐱᔭᐅᖃᑦᑕᕐᓂᖏᑦᑎᒍ ᑕᐃᒪᙵᓂᑦ 1990-ᒥᑦ.

ᑲᑐᑎᓗᒍ ᓄᓇᕗᑦ ᐱᕈᖅᐸᑦᑕᐊᑎᑦᑕᕗᑦ
Building Nunavut Together
Nunavu liuqatigiingniq
Bâtir le Nunavut ensemble

ᐊᕙᑎᓕᕆᔨᒃᑯᑦ
Department of Environment
Avatiliqiyikkut
Ministère de l’Environnement

ᐃᑭᕿᓴᐅᑉ ᐃᒪᖓᓂ ᓇᓄᐃᑦ ᖃᐅᔨᓴᖅᑕᐅᓚᐅᖅᑎᓪᓗᒋᑦ ᖃᐅᔩᓴᒥᓃᑦ ᓴᖅᑭᖅᓯᒪᔪᑦ

ᑐᓴᓇᐊᕐᕕᖃᖅᑐᑦ ᐊᒃᑑᕝᕙ 20-28, 2020

ᑐᓴᓇᐊᕐᕕᖃᓚᐅᖅᑎᓪᓗᒋᑦ ᓇᐃᓈᖅᓯᒪᔪᑦ ᐅᓂᒃᑳᓕᐊᓇᔭᐅᓯᒪᓂᖏᑦ

ᓇᓄᕐᓂᑦ ᖃᐅᔨᓴᖅᑏᑦ
ᐊᕙᑎᓕᕆᔨᒃᑯᑦ
ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ
ᐃᒡᓗᓕᒃ, ᓄᓇᕗᑦ

ᐅᓂᒃᑳᑉ ᓇᐃᓈᖅᓯᒪᓂᖕᒋᑦ

ᓄᓇᕗᑦ ᓴᕙᒪᖕᒋᑦ, ᐊᕙᑎᓕᕆᔨᒃᑯᓐᓂ ᑭᒡᒐᖅᑐᐃᔩᑦ, ᐊᒻᒪᓗᑦᑕᐅᖅ ᐱᖃᑎᒋᔭᐅᓪᓗᑎᑦ ᑭᒡᒐᖅᑐᐃᔪᑦ ᕿᑎᕐᒥᐅᑦ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖕᒋᑦ, ᓄᓇᕗᑦ ᑐᙵᕕᒃ ᑎᒥᖓ, ᓄᓇᕗᒻᒥ ᐆᒪᔪᓕᕆᔨᕐᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖕᒋᑦ, ᐱᖃᑕᐅᔪᓐᓇᕋᐃᒻᒪᑕ, ᑐᓴᓇᐊᕐᕕᖃᖅᐸᓚᐅᖅᐳᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖕᒋᖕᓂ ᐊᒃᑐᕝᕙ 20-28, 2020-ᐅᑎᓪᓗᒍ. ᐱᔾᔪᑎᒋᓚᐅᖅᑖ ᑐᓴᓇᐊᕐᕕᖃᖅᑎᓪᓗᒋᑦ ᐊᐅᓚᑦᑎᔨᐅᖃᑎᒌᑦᑐᓄ ᓇᓗᓇᐃᔭᐃᖁᓪᓗᒋᑦ ᒫᓐᓇᓕᓴᐅᓛᙳᔪᓂᑦ ᖃᓪᓗᓇᕐᔨᕐᙵᑦ ᖃᐅᔨᓴᐅᓯᖕᒋᑎᒍᑦ ᖃᐅᔾᔫᒥᓃᑦ ᓴᖅᑭᖅᓯᒪᓂᖕᒋᑦ ᑕᐃᑲᓂ ᐃᑭᕋᓴᐅᑉ ᐃᒪᖓᓂ ᓇᓄᐃᑦ ᑕᐃᑲᓃᑦᑐᑦ ᐊᒥᓲᓂᖕᒋᑦ, ᐊᒻᒪᓗᑦᑕᐅᖅ ᐅᖃᐅᓯᒃᓴᓇᔭᐅᔪᓂ ᓄᐊᑦᑎᓪᓗᑎᑦ ᓴᖅᑭᖅᓯᒪᔪᑦ ᐅᓂᒃᑲᐅᑕᐅᓯᒪᔪᓂᑦ ᐊᒻᒪᓗ ᓄᐊᑦᑎᒃᑲᓐᓂᖅᑐᑎᑦ ᐱᖅᑯᓯᑐᖃᖅᑎᒍᑦ ᖃᐅᔨᒪᔭᐅᔪᓂᑦ. ᑕᐃᒃᑯᐊᑐᐊᖅ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖕᒋᑦ ᓄᓇᓕᐅᔪᓂᑦ ᐊᖑᓇᓱᓲᑦ ᐃᑭᕋᓴᐅᑉ ᐃᒪᖓᓂ ᑐᓴᓇᐊᕐᕕᐅᓚᐅᖅᐳᑦ. ᐅᖃᐅᓯᒃᓴᓇᔭᐅᔪᑦ ᐊᒻᒪᓗ ᐱᖅᑯᓯᑐᖃᖅᑎᒍᑦ ᖃᐅᔨᒪᔭᐅᔪᑦ ᓄᐊᑕᒥᓃᑦ ᑕᐃᑲᙵᑦ ᑐᓴᓇᐊᕐᕕᖃᖅᑎᓪᓗᒋᑦ ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑕᐅᒐᔭᖅᐳᑦ ᐋᖅᑭᑎᓪᓗᒋᑦ ᑲᑎᓕᒫᖅᑐᒋᑦ ᐊᖑᔭᐅᔪᓐᓇᖅᑐᑦ ᐊᒥᓲᓂᖕᒋᖕᓂ ᐃᑭᕋᓴᐅᑉ ᐃᒪᖓᓂ ᓇᓄᐃᑦ ᐊᒥᓲᓂᑦ ᑐᓂᔭᐅᒐᔭᖅᑐᑎᓪᓗ ᑕᒪᒃᑯᐊ ᐊᑐᓕᖁᔭᐅᔪᑦ ᓄᓇᕗᒻᒥ ᐆᒪᔪᓕᕆᔨᕐᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖕᒋᖕᓄᑦ ᐃᓱᒪᓕᐅᕈᑕᐅᒐᔭᕐᒪᑕ. ᑖᓐᓇ ᐅᓂᒃᑳᖅ ᓇᐃᓈᓯᐊᖅᓯᒪᕗᖅ ᐅᖃᐅᓯᒃᓴᓇᔭᐅᓚᐅᖅᑐᓂᑦ ᑐᓴᓇᐊᕐᕕᖃᖅᑎᓪᓗᑕ ᐃᓚᐅᖃᑕᐅᓚᐅᖅᑐᓂᑦ.

ᑐᑭᓯᑦᑎᕆᐊᙳᐅᑎᖏᑦ ᐱᕆᐊᕈᑏᑦ

ᑖᒃᑯᐊ ᐅᓂᒃᑳᑦ ᑭᒡᒑᖅᑐᐃᕗᑦ ᐊᕙᑎᓕᕆᔾᔪᑦ ᐱᓇᓱᐊᑦᑎᐊᕈᓐᓇᕐᓂᓕᒫᖏᖕᓂ ᒪᓕᑦᑐᑎᑦ ᐱᑦᑎᐊᖅᓯᒪᔪᒃᑯᑦ ᑕᑯᑎᑦᑎᓇᓱᐊᖅᓯᒪᓂᖏᖕᓂᑦ ᑕᒪᐃᓐᓂ ᑐᑭᓯᕆᐊᕈᑎᓂᑦ ᑲᑐᔾᔾᐅᓚᐅᖅᓯᒪᔪᑦ ᑐᓴᕆᐊᕐᕕᖃᕐᓂᕐᒧᑦ ᑲᑎᒪᖃᑎᖃᖅᑎᓪᓗᑕ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔭᖃᑎᑏᖏᖕᓂᑦ ᐅᑯᓇᓂ ᓄᓇᓕᐅᔪᓂᑦ ᐅᖅᓱᖅᑑᖅ, ᐃᒡᓗᓕᒃ, ᑯᒎᖅᔪᒃ, ᓇᐅᔾᔭᑦ, ᓴᓂᕋᔭᒃ, ᐊᒻᒪᓗ ᑕᓗᕐᔪᐊᖅ. ᑕᐅᑦᑐᖏᑦ ᐅᖃᐅᑕᐅᓯᒪᔪᑦ ᑖᒃᑯᓂ ᐊᔾᔨᓴᐃᓐᓇᕆᙵᓚᐃᑦ ᐊᕙᑎᓕᕆᔾᔪᑦ ᑕᐅᑦᑐᕆᔭᖏᑕ, ᐅᕝᕙᓘᓐᓃᑦ ᓄᓇᕗᑦ ᒐᕙᒪᒃᑯᑦ ᑕᐅᑦᑐᕆᔭᖏᖕᓂ ᐊᔾᔨᖃᒃᓴᐃᓐᓇᙱᓚᑦ.

ᐃᓗᓕᖕᒋᑦ

1.0 ᐅᓂᒃᑳᑉ ᐱᔾᔪᑎᖏᑦ ᐊᒻᒪᓗ ᐋᖅᑭᒃᓱᖅᓯᒪᓂᖏᑦ

ᑖᓐᓇ ᐅᓂᒃᑳᖅ ᐋᖅᑭᒃᓱᖅᑕᐅᓯᒪᔪᖅ ᐊᕕᑦᑐᐃᖁᑦᑐᒍ ᓇᐃᓈᖅᓯᖁᑦᑐᒍᑐ ᑕᐅᒃᑯᓂᖓ ᐅᖃᐅᓯᒃᓴᕆᔭᐅᓯᒪᔪᓂᑦ, ᐊᐱᖅᑯᑎᒥᓂᕐᓂᑦ, ᐃᓱᒫᓘᑎᒥᓂᕐᓂᑦ ᐊᒻᒪᓗ ᖃᓄᐃᓕᐅᕐᑯᔭᐅᓯᒪᓂᕆᔭᖏᖕᓂᑦ ᐅᑯᓄᖓ ᐅᖃᐅᑕᐅᓯᒪᔪᓄᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑕ ᖃᓄᐃᓕᐅᕈᑎᖃᕆᐊᖅᑐᑎᑦ ᓴᖅᑭᖅᓯᒪᔪᓂᑦ ᑕᐃᑲᙵᑦ 2015-2017–ᖑᑎᓪᓗᒍ ᐃᑭᕋᓴᑉ ᐃᒪᖓ ᖃᓪᓗᓇᕐᔨᕐᖓᑦ ᖃᐅᔨᓴᐅᓯᖏᑦ ᒪᓕᑦᑐᒋᑦ ᖃᐅᔨᓭᒥᓃᑦ. ᓯᕗᓂᐊᒍᑦ ᖃᐅᔨᓴᓚᐅᖅᑎᓐᓇᒋᑦ ᓱᓕ ᑐᓴᕆᐊᕐᕕᑭᔭᒥᓂᐅᕗᑦ ᐅᑯᐊ ᓄᓇᓖᑦ 2013–ᖑᑎᓪᓗᒍ.

ᐅᑯᐊ ᓄᓇᓖᑦ ᑐᓴᕆᐊᕐᕕᐅᓚᐅᖅᓯᒪᕗᑦ ᐅᕙᙵᑦ ᐊᒃᑑᕙ 20-28, 2020:

- ᐅᖅᓱᖅᑑᖅ, ᐊᒃᑑᕙ 20, 2020
- ᑕᓗᕐᔪᐊᖅ, ᐊᒃᑑᕙ 21, 2020
- ᑰᒑᕐᔪᒃ, ᐊᒃᑑᕙ 22, 2020
- ᓇᐅᔼᑦ, ᐊᒃᑑᕙ 26, 2020
- ᓴᓂᕋᔭᒃ, ᐊᒃᑑᕙ 27, 2020
- ᐃᒡᓗᓕᒃ, ᐊᒃᑑᕙ 28, 2020

ᑲᑎᒪᓂᕐᑲᖅᑎᓪᓗᒋᑦ ᐊᕙᑎᓕᖕᐋᒃᑯᑦ ᐅᖃᐅᔾᐋᓚᐅᖅᐳᑦ ᖃᓄᖅ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑕ ᑲᑎᓕᒫᖅᑐᒋᑦ ᐊᖑᔭᐅᔪᓐᓇᖅᑐᑦ ᐊᒥᓲᓂᖏᖕᓂ ᐊᑐᓕᕐᑯᐋᒐᔭᕐᒪᖕᒋᑕ ᑖᓯᒍᖓ ᐃᑭᕋᓴᑉ ᐃᒪᖕᒐᓃᑦᑐᑦ ᓇᓄᕐᓂᑦ. ᑭᒡᒐᖅᑐᐃᔾᐅᔪᑦ ᐅᑯᓇᙵᑦ ᓄᓇᕗᒻᒥ ᐆᒪᔪᓕᕆᔩᕐᔪᐊᒃᑯᑦ ᑲᑎᒪᔩᖏᑦ, ᓄᓇᕗᑦ ᑐᙵᕕᒃ ᑎᒥᖓ, ᕿᑎᕐᒥᐅᓂ ᐆᒪᔪᓕᕆᔩᒃᑯᑦ ᑲᑎᒪᔩᖏᑦ, ᑭᕙᓪᓕᕐᒥ ᐆᒪᔪᓕᕆᔩᒃᑯᑦ ᑲᑎᒪᔩᖏᑦ, ᐊᒻᒪᓗ ᕿᑭᖅᑖᓗᒻᒥ ᐆᒪᔪᓕᕆᔩᒃᑯᑦ ᑲᑎᒪᔩᖏᑦ ᖃᐃᕐᑯᔭᐅᓚᐅᖅᐳᑦ ᑲᑎᒪᕐᑯᔭᐅᓪᓗᑎᑦ ᐊᒻᒪᓗ ᐃᓚᐅᖃᑕᐅᓚᐅᖅᑐᑎᑦ ᑭᒡᒐᖅᑐᐃᔩᑦ ᐃᓄᒃᑎᑐᑦ ᑲᑎᒪᖃᑕᐅᔪᓐᓇᕋᐃᒻᒪᑕ.

2.0 ᐱᔾᔪᑎᖏᑦ ᑐᓴᕆᐊᕐᕕᖃᕐᓂᕐᒧᑦ

ᐱᔾᔪᑎᖃᓚᐅᖅᐳᑦ ᑐᓴᕆᐊᕐᕕᖃᖅᑐᑎᑦ ᐅᖃᐅᓯᕆᔭᐅᓗᑎᑦ ᓄᑖᖑᑖᖑᔪᑦ ᖃᓪᓗᓇᕐᔨᕐᖓᑦ ᖃᐅᔨᓴᐅᓯᖏᑦ ᒪᓕᑦᑕᐅᓪᓗᑎᑦ ᑐᑭᓯᑭᐊᕈᑕᒥᓂᐅᔪᑦ ᐱᔾᔪᑎᓖᑦ ᐃᑭᕋᓴᑉ ᐃᒪᖓ ᓇᓄᐃᑦ ᐊᕕᑦᑐᖅᓯᒪᔪᒥ ᐊᒥᓲᓂᖏᑦ ᐅᖃᐅᑕᐅᓯᒪᓪᓗᑎᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑕ ᖃᓪᓗᓇᕐᔨᕐᖓᑦ ᖃᐅᔨᓴᐅᓯᖏᑦ ᒪᓕᑦᑐᒋᑦ ᖃᐅᔨᓭᑦ ᐅᓂᒃᑳᓕᐊᕆᔭᐅᓯᒪᔪᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑕ ᓇᓄᓕᕆᔨᕐᑯᑎᖏᖕᓄᑦ. ᐊᒻᒪᓗᒃᑲᓐᓂᖅ, ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ ᑐᓂᓯᓚᐅᕆᕗᑦ ᑲᑎᓕᒫᖅᑐᑎᑦ ᐊᖑᔭᐅᔪᓐᓇᖅᑐᑦ ᐊᒥᓲᓂᖏᑦ ᐊᑐᓕᕐᑯᔭᐅᔪᑦ ᑐᓴᕆᐊᕐᕕᖃᖅᑎᓪᓗᒋᑦ, ᑭᓯᐊᓂᓗ ᐅᖃᐅᓯᕐᑲᓚᐅᖅᑐᑎᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᓇᓱᐊᕐᒐᖏᑦ ᐋᖅᑭᒃᓱᖅᑕᐅᔪᓐᓇᕐᒪᑕ ᒪᓕᑦᑐᒋᑦ ᓄᓇᓕᐅᔪᑦ ᑭᙶᒪᔨᔭᖏᑦ ᐊᒻᒪᓗ ᐱᓇᓱᐊᕐᒐᖏᑦ ᐊᐅᓚᑦᑎᕐᑲᑎᕐᕆᕐᑯᑦᑐᒋᑦ ᑕᒪᒃᑯᓂᖓ ᓇᓄᐃᑦ ᐊᒥᓲᓂᖏᖕᓂᑦ ᐊᕕᑦᑐᖅᓯᒪᔫᑦᑐᑦ.

2.1 ᐋᖅᑭᓱᖅᓱᒪᓂᖏᑦ ᑲᑎᒪᓂᐅᔪᑦ

ᑲᑎᒪᓂᖃᖃᑦᑕᓚᐅᖅᐳᑦ ᐅᓐᓄᒃᑯᑦ (ᐆᑦᑑᑎᒋᓗᒍ ᐱᒋᐊᖅᑐᑎᑦ ᐊᑯᓐᓚᖏᓐᓂ ᓱᕿᙳᔭᖅ 17:00–ᒨᖅᑎᓪᓗᒍ ᐊᒻᒪᓗ 18:30–ᒥ) ᐊᑯᓂᐅᓂᖃᖅᐸᓚᐅᖅᐳᓪᓗ ᑲᑎᒪᓂᖏᑦ ᐃᒪᓐᓇᑎᒋ 2.5 ᑎᑭᑦᑐᒍ 4 ᐃᑲᕐᕋᑦ ᑐᙵᕕᒋᓪᓗᒋᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑦ ᑲᑎᒪᓂᕈᒪᓂᖏᑦ ᖃᓄᑎᒋ. ᑲᑎᒪᓂᖅ ᐊᐅᓚᑕᐅᕙᓚᐅᖅᐸᖅ ᐊᒻᒪᓗ ᓯᕗᒃᖃᖅᑕᖅᑎᕐᑲᐅᖅᑐᑎᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖓᑕ ᓇᓄᓕᕆᔨᖏᒃ L. ᑎᒃ ᐊᒻᒪᓗ ᔨ. ᕗᐃᐅᕐ. ᓇᓄᓕᕆᔩᒃ ᐅᓂᒃᑲᐅᓯᖃᖅᐸᓚᐅᖅᔾᔾᒃ ᐅᐊᑦᑎᐊᕈ ᐊᐅᓚᑕᐅᓂᕆᖃᑦᑕᓚᐅᖅᓯᒪᔭᖏᑕ ᐋᖅᑭᓱᖅᓱᒪᓚᐅᖅᓯᒪᔭᖏᓐᓂᑦ, ᐊᒻᒪᓗ ᐅᖃᐅᓯᖃᑦᑎᐊᖅᑐᑎᑦ ᓇᓗᓇᐃᔭᖅᓱᒪᓂᖏᓐᓂᑦ ᓴᖅᑭᖅᓱᒪᔪᑦ 2015-2017 ᓇᓄᐃᑦ ᖃᐅᔨᓴᖅᑕᐅᓚᐅᖅᓱᒪᓂᕆᔭᖏᑦᑕ ᐃᑭᕋᓴᐸ ᐃᒪᖓᓂ (ᐅᐃᒍᖓ 1). ᑲᑎᒪᕐᑲᑕᐅᔪᓪᓗ ᐊᐱᖅᓱᖁᔭᐅᕙᓚᐅᖅᐳᑦ, ᐃᓱᒫᓘᑎᒥᖕᓂᒃ ᐅᖃᐅᓯᖃᕐᓗᑎᑦ, ᐅᕝᕙᓘᓐᓃᑦ ᐊᑐᓂᖁᔨᖁᔭᐅᕙᑦᑐᑎᑦ ᑲᑎᒪᓂᖃᖅᑎᓪᓗᒋᑦ. ᐅᖃᐅᑕᐅᓚᐅᕆᕗᖅ ᓱᓕ ᑲᔪᓯᓂᖃᐃᓐᓇᕐᒪᑦ ᐃᑭᕋᓴᐸ ᐃᒪᖓ ᐱᖅᑯᓱᑐᖃᖅᑎᒍᑦ ᖃᐅᔨᒪᓂᖏᑦ ᒪᓕᑦᑐᒋᑦ ᖃᐅᔨᓴᕐᓂᕐᒥᒃ ᓴᖅᑭᖅᑐᑦ ᖃᐅᔨᓵᕐᒥᒃ ᓂᕆᐅᒋᔭᐅᒐᔭᕐᒪᑕ ᐱᔭᕇᖅᑕᐅᓗᑎᑦ ᐃᓱᓕᑦᑎᕙᑦ 20202, ᒪᓕᑦᑐᒍ ᓄᕙᒡᔪᐊᕐᓇᖅ-19 ᖃᓄᐃᓐᓂᕆᓕᖅᑕᖓ.

ᐅᓂᒃᑳᓚᐅᖅᑎᓪᓗᒋᑦ, ᐊᐱᖅᑯᑎᒃᓴᖃᖅᑐᑦ ᐊᐱᖅᓱᖅᐸᓚᐅᖅᐳᑦ/ᐅᖃᐅᓯᖃᖅᑐᑎᑦ ᐊᐱᖅᑯᑎᒃᓴᖅᑕᖃᕈᓐᓂᕋᓱᐊᕐᓂᖓᓂᒃ. ᐃᓱᓕᑦᑎᒐᐃᒻᒪᑕ ᑲᑎᒪᓃᑦ, ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ ᐅᖃᖃᑦᑕᓚᐅᖅᐳᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦᑕ ᖃᓄᐃᓕᖓᕐᑯᔭᖏᑦ ᐱᔾᔪᑎᒋᓪᓗᒋᑦ ᑲᑎᓕᒫᖅᑐᒋᑦ ᐊᖑᔭᐅᔪᓐᓇᖅᑐᑦ ᐊᒥᓲᓂᖏᑦ ᑕᐃᑲᓂ ᐃᑭᕋᓴᐸ ᐃᒪᖓᓂ. ᐊᒻᒪᓗᒃᑲᓐᓂᖅ, ᐅᖃᐅᑕᐅᓚᐅᕆᕗᖅ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦᑕ ᖃᓄᐃᓕᐅᕐᑯᔭᖏᑦ ᐊᔾᔨᖅᓴᐃᓐᓇᔾᔮᖏᒻᒪᑕ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᓇᓱᐊᕐᒐᕆᔭᐅᔪᑦ ᑎᑭᑕᐅᓇᓱᐊᕈᑎᖏᑦ ᓄᓇᓕᐅᔪᓄᑦ ᐊᒻᒪᓗ ᓄᓇᓕᒻᒥᐅᑕᐅᔪᑦ ᑲᔪᖏᖅᓴᖅᑕᐅᕙᓚᐅᖅᐳᑦ ᐃᖅᑲᓇᐃᔭᖅᑎᖃᖃᑦᑕᖅᑯᔭᐅᓪᓗᒋᑦ ᐊᕙᑦᑐᖅᓱᒪᔪᓂ ᐆᒪᔪᓕᑦᑕᓇᓂᕐᒧᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᖏᓐᓂᑦ ᐊᒻᒪᓗ/ᐅᕝᕙᓘᓐᓃᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᓐᓂᑦ ᐋᖅᑭᒃᓱᐃᕐᑯᓪᓗᒋᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐱᓇᓱᐊᕐᒐᕆᔭᐅᓂᐊᖅᑐᑦ ᑖᒃᑯᓄᖓ ᐃᑭᕋᓴᐸ ᐃᒪᖓᓂ ᓇᐃᑦ ᐊᒥᓲᓂᖏᑦ. ᓇᓄᓕᕆᔨᐅᔫᒃ ᓇᓗᓇᐃᔭᐃᓚᐅᖅᑐᑎᒃ ᐃᓱᒪᒃᓴᖅᓱᐅᕈᑕᐅᓂᖏᑦ ᑲᑎᓕᒫᖅᑐᑎᑦ ᐊᖑᔭᐅᔪᓐᓇᖅᑐᑦ ᐊᒥᓲᓂᖏᑦ ᐊᔾᔨᖅᑲᖏᑦᑎᓪᓗᒋᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦᑕ ᐊᑐᓕᖁᔭᖏᓐᓂᑦ ᐱᖃᓱᐅᔾᔨᒐᔭᖅᐳᑦ ᓇᓗᓇᐃᕐᓂᖏᑦ ᓴᖅᑭᖅᑐᑦ ᖃᐅᔨᓵᕐᒥᒃ, ᐊᕙᑎ ᐊᓯᔾᔨᕐᓂᖓ, ᐊᒻᒪᓗ ᓄᓇᓕᐅᔪᑦ ᑭᙯᒪᒋᔭᖏᑦ. ᐅᖃᐅᓯᖃᖅᐸᓚᐅᖅᐳᑦ ᐊᒻᒪᓗ ᐊᐱᖅᓲᑕᐅᓪᓗᒋᑦ ᓇᓗᓇᐃᒃᑯᓯᖅᓱᖅᑕᐅᓂᐊᕐᓂᖏᑦ ᓱᑯᑦᑎᐊᓂ ᐃᑭᕋᓴᐸ ᐃᒪᖓᓂ ᐊᒻᒪᓗ ᕿᑎᕐᒥᐅᑦ ᐃᒪᖓᓂᑦ ᓄᓇᓕᐅᔪᑦ ᑕᐅᕙᙵᑦ ᓇᓐᓄᒐᓱᐊᓲᑦ ᑕᒪᒃᑮᓐᓂᑦ ᐊᕕᑦᑐᖅᓱᒪᔫᓐᓂᒃ ᓇᓄᐃᑦ ᐊᒥᓲᓂᖏᖕᓂᑦ. ᓇᓄᓕᕆᔨᐅᔫᒃ ᐅᖃᐅᔾᔨᓚᐅᖅᔾᔾᒃ ᑲᑎᒪᕐᑲᑕᐅᔪᓂᑦ ᑕᒪᓐᓇ ᐱᔾᔪᑕᐅᒻᒪᑦ ᐊᕕᑦᑐᖅᓱᒪᔪᓂᑦ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᖏᓄᑦ ᑲᒪᒋᔭᐅᔭᕆᐊᖃᕐᒪᑦ ᓂᕕᖓᑖᓕᖅᓱᐃᖓᔭᕐᓂᖏᖏᓄᑦ ᓇᓄᐃᑦ ᐊᒥᓲᓂᖏᑦ ᓴᙱᓂᖃᕐᕕᖓᓃᑦᑎᓪᓗᒋᑦ.

3.0 ᓇᐃᓈᖅᓱᒪᓂᖏᑦ ᓄᓇᓕᑎᒍᑦ

ᐱᓇᓱᐊᒐᖏᑦ ᑕᒪᒃᑯᐊ ᑐᓴᕆᐊᕐᕕᖃᕐᓂᕐᒧᑦ ᑲᑎᒪᓂᐅᔪᑦ ᓱᖅᑯᐃᓇᖅᑎᑕᐅᓚᐅᖅᐳᑦ ᐅᖃᐅᑕᐅᓪᓗᒋᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑕ ᐃᓚᒋᔭᐅᔪᕐᑯᑎᖏᖏᓄᑦ ᓯᕗᓂᐊᒍᑦ ᐊᒻᒪᓗ ᐱᒋᐊᖅᑎᓪᓗᒋᑦ ᑲᑎᒪᓃᑦ ᐊᑐᓂ. ᐊᒥᓱᓂᑦ ᐊᔾᔨᒌᑦᑐᒡᒍᓂᑦ ᐊᐱᖅᑯᑎᒃᓴᖅᑕᖃᖅᐸᓚᐅᖅᐳᖅ, ᐃᓱᒫᓘᑎᓂᑦ ᐊᒻᒪᓗ ᖃᓄᓕᐅᕐᑯᔭᐅᔾᔪᑎᓂᑦ ᑖᒃᑯᓄᖓ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑦ ᑲᑎᒪᔨᖏᖕᓄᑦ ᓄᓇᓕᐅᔪᓂᑦ ᑐᓴᕆᐊᕐᕕᐅᔪᓄᑦ. ᑕᒪᐃᓐᓂ, ᓇᓗᓇᐃᔭᑦᑎᐊᖅᓱᒪᔪᖅ ᐅᓂᒃᑳᖅ ᐊᐱᖅᑯᑕᐅᕙᓚᐅᖅᑐᓂᑦ ᐊᒻᒪᓗ ᐅᖃᐅᓯᒃᓴᓇᔭᐅᕙᓚᐅᖅᑐᓂᑦ ᐊᑐᓂ ᓄᓇᓕᐅᔪᓂᑦ ᓇᓂᔭᐅᔪᓐᓇᖅᐳᑦ ᐅᐃᒍᖓ 2-ᒥ.

3.1 ᐅᖅᓱᖅᑑᕐᒥ ᑐᓴᕆᐊᕐᕕᖃᓚᐅᖅᑎᓪᓗᑕ ᓇᐃᓈᖅᓱᒪᓂᖏᑦ

ᐅᓪᓗᖅ: ᐊᒃᑑᕝᕙ 20, 2020
ᓱᕿᙳᔭᖅ: 18:50 – 21:15

ᑲᑎᒪᕐᑲᑕᐅᔪᑦ:

- ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᓇᓄᓕᕆᔩᒃ L. ᑎᒃ, ᔭ. ᕗᐃᐅᕐ

- ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐆᒪᔪᕐᓂᐊᖅᑎ ᔨ. ᔅᑭᓕᕐ
- ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐊᕕᑦᑐᖅᓯᒪᔪᒥ ᐊᐅᓚᑦᑎᔨ, ᑭ. ᒥᑐᐊᓐ
- ᐅᖅᓱᖅᑑᖅ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑕ ᑲᑎᒪᔨᖏᑦ

ᐅᖃᐅᓯᒃᓴᑦ ᐊᒻᒪᓗ ᐊᐱᖅᑯᑎᒃᓴᑦ:

ᐅᓂᒃᑲᐅᓯᖃᓚᐅᖅᑎᓪᓗᒥᒃ ᐃᑭᕋᓴᑉ ᐃᒪᖕᒐᓃᑦᑐᑦ ᓇᓄᐃᑦ ᒥᒃᓵᓄᑦ, ᑲᑎᒪᔨᐅᔪᑦ ᐅᖃᐅᓯᖃᓚᐅᖅᐳᑦ ᐊᑐᖃᑦᑕᖅᓯᒪᔭᖏᑦ ᐊᕐᕌᒎᓕᖅᑐᓂᑦ ᓇᓕᒧᓐᓂᖃᖅᑐᒥᓂᐅᓪᓗᑎᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑕ ᖃᐅᔨᓵᓇᓯᒪᔭᖏᑦᑕ ᖃᐅᔨᔭᒥᓂᐅᔪᓂᑦ. ᑕᒪᐃᓐᓂᓕ, ᑲᑎᒪᔨᐅᔪᑦ ᐊᖏᕈᑎᖃᖅᓯᒪᕗᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑕ ᖃᐅᔨᓯᒪᔭᖏᖕᓂᑦ ᖃᐅᔨᓴᓚᐅᖅᑎᓪᓗᒋᑦ. ᓱᖅᑯᐃᓇᕐᓂᖅᓴᐅᓕᓚᐅᓇᕗᖅ ᐅᖃᐅᓯᒃᓴᖏᖕᓂᑦ ᑲᑎᒪᔨᐅᔪᑦ ᐅᓪᓗᒥ, ᐊᖑᓯᓗᐊᕌᓗᒃᐸᙱᒻᒪᑕ ᐃᑭᕋᓴᑉ ᐃᒪᖕᒐᓂ ᐅᖅᓱᖅᑑᕐᒥᐅᑦ ᐊᖑᓇᓱᑦᑎᖏᖕᓄᑦ ᓱᑯ ᐊᓯᔾᔨᓗᐊᖅᑐᐊᓘᖃᑦᑕᕐᒪᑦ. ᐃᓚᖏᑦ ᐅᖃᐅᑕᐅᓚᐅᓇᕗᑦ ᓂᕕᖕᒐᑖᓕᖅᓯᐃᖃᑦᑕᓂᕐᒥᒃ ᐃᑭᕋᓴᑉ ᐃᒪᖕᒐᓂᑦ ᐊᒻᒪᓗ ᕿᑎᕐᒥᐅᑦ ᐃᒪᖕᒐᓂᓪᓗ ᓱᑯᑦᑎᐊᓅᖕᒐᑎᑕᐅᓂᖏᑦ ᓇᓕᒧᕇᙱᓗᐊᖅᑐᐊᓘᖃᑦᑕᕐᒪᑕ, ᐱᓗᐊᖅᑐᒥᒃ ᒦᓐᓇᐅᔪᖅ ᕿᑎᕐᒥᐅᑦ ᐃᒪᖕᒐᓂ ᓇᓄᐃᑦ ᐊᒥᓲᓂᖅᓴᓪᒪᓇᐊᓘᓕᖅᑎᓪᓗᒋᑦ. ᓄᓇᕗᑦ ᒐᕙᒪᖏᖕᓂ ᑭᒡᒐᖅᑐᐃᔨᐅᔪᑦ ᑖᔅᓯᒥᖓ ᐱᔾᔪᑎᒥᒃ ᐅᖃᐅᓯᖅᑯᔨᓚᐅᖅᐳᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᖕᓂᑦ ᑖᒃᑯᓄᖓ ᕿᑎᕐᒥᐅᓂ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᖕᓄᑦ. ᑲᑎᒪᔩᑦ ᖁᔭᓐᓇᒦᓚᐅᖅᐳᑦ ᖁᔭᓕᓪᓗᑎᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ ᓂᐅᕐᕈᓚᐅᕐᒪᑕ ᓄᓇᓕᖕᒐᓄᑦ ᐅᓂᒃᑲᐅᓯᖃᕙᖅᑐᑎᑦ ᖃᐅᔨᓵᕐᓂᓃᑦ ᖃᐅᔨᓴᕐᓂᐅᔪᓂᑦ ᐊᒻᒪᓗ ᐅᖃᖅᑎᖃᕙᖅᑐᑎᑦ. ᓱᖁᐃᓇᖅᓯᑎᑦᑎᒋᐊᓚᐅᖅᐳᓪᓗ ᖃᓄᖅ ᓇᓄᕐᓂᑦ ᐅᔾᔨᖅᓱᑦᑎᐊᕐᓂᕐᒥᒃ ᐊᒻᒪᓗ ᐊᑐᓂ ᐃᓄᐃᑦ ᐱᓕᕆᐊᕐᒧᑦ ᑲᒪᒋᔭᖃᕐᓂᑦ ᑐᕌᖓᓂᖃᕐᒪᑕ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦᑕ ᐱᓕᕆᐊᖏᓄᑦ.

3.2 ᑕᓗᕐᔪᐊᕐᒥ ᑐᓴᕐᓇᕐᕕᖃᓚᐅᖅᑎᓪᓗᑕ ᓇᐃᓈᖅᓯᒪᓂᖏᑦ

ᐅᓪᓗᖅ: ᐊᒃᑑᐸ 21, 2020
ᓯᕗᓪᓕᖅᐹᖅ: 17:45 – 20:15

ᑲᑎᒪᖃᑕᐅᔪᑦ:
- **ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ**–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᓇᓄᓕᕆᔨ L. ᑎᒃ, ᔭ. ᕗᐃᐅᕐ
- **ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ**–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐆᒪᔪᕐᓂᐊᖅᑎ C. ᐊᕐᓇᕕᓗᒃ
- **ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ**–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐊᕕᑦᑐᖅᓯᒪᔪᒥ ᐊᐅᓚᑦᑎᔨ,K. ᒥᑐᐃᐊᓐ.
- ᑕᓗᕐᔪᐊᖅ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑦ ᑲᑎᒪᔨᖏᑦ

ᐅᖃᐅᓯᒃᓴᑦ ᐊᒻᒪᓗ ᐊᐱᖅᑯᑎᒃᓴᑦ:

ᐅᓂᒃᑲᐅᓯᖃᓚᐅᖅᑎᓪᓗᒥᒃ ᐃᑭᕋᓴᑉ ᐃᒪᖕᒐᓃᑦᑐᑦ ᓇᓄᐃᑦ ᒥᒃᓵᓄᑦ, ᑲᑎᒪᔨᐅᔪᑦ ᐅᖃᐅᓯᖃᓚᐅᖅᐳᑦ ᐊᑐᖃᑦᑕᖅᓯᒪᔭᖏᑦ ᐊᕐᕌᒎᓕᖅᑐᓂᑦ ᓇᓕᒧᓐᓂᖃᖅᑐᒥᓂᐅᓪᓗᑎᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑕ ᖃᐅᔨᓵᓇᓯᒪᔭᖏᑦᑕ ᖃᐅᔨᔭᒥᓂᐅᔪᓂᑦ. ᑕᒪᐃᓐᓂᓕ, ᑲᑎᒪᔨᐅᔪᑦ ᐊᖏᕈᑎᖃᖅᓯᒪᕗᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖏᑕ ᖃᐅᔨᓯᒪᔭᖏᖕᓂᑦ ᖃᐅᔨᓴᓚᐅᖅᑎᓪᓗᒋᑦ. ᐃᓚᖏᑦ ᐅᖃᐅᑕᐅᓚᐅᓇᕗᑦ ᓂᕕᖕᒐᑖᓕᖅᓯᐃᖃᑦᑕᓂᕐᒥᒃ ᐃᑭᕋᓴᑉ ᐃᒪᖕᒐᓂᑦ ᐊᒻᒪᓗ ᕿᑎᕐᒥᐅᑦ ᐃᒪᖕᒐᓂᓪᓗ ᓱᑯᑦᑎᐊᓅᖕᒐᑎᑕᐅᓂᖏᑦ ᓇᓕᒧᕇᙱᓗᐊᖅᑐᐊᓘᖃᑦᑕᕐᒪᑕ, ᐱᓗᐊᖅᑐᒥᒃ ᒦᓐᓇᐅᔪᖅ ᕿᑎᕐᒥᐅᑦ ᐃᒪᖕᒐᓂ ᓇᓄᐃᑦ ᐊᒥᓲᓂᖅᓴᓪᒪᓇᐊᓘᓕᖅᑎᓪᓗᒋᑦ. ᓄᓇᕗᑦ ᒐᕙᒪᖏᖕᓂ ᑭᒡᒐᖅᑐᐃᔨᐅᔪᑦ ᑖᔅᓯᒥᖓ ᐱᔾᔪᑎᒥᒃ ᐅᖃᐅᓯᖅᑯᔨᓚᐅᖅᐳᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑦ ᑖᒃᑯᓄᖓ ᕿᑎᕐᒥᐅᓂ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᖕᓄᑦ.

3.3 ᑯᒌᕐᔪᐊᕐᒥ ᑐᓴᕐᓇᕐᕕᖃᓚᐅᖅᑎᓪᓗᑕ ᓇᐃᓈᖅᓯᒪᓂᖏᑦ

ᐅᓪᓗᖅ: ᐊᒃᑑᐸ 22, 2020
ᓯᕗᓪᓕᖅᐹᖅ: 18:50 – 21:20

ᑲᑎᒪᕐᑲᑕᐅᔪᑦ:
- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᓇᓄᓕᕆᔩᑦ ᒪ. ᑎᒃ, ᔭ. ᕗᐃᐅᕐ
- ᑰᒑᕐᔪᒃ/ ᑯᖅᑕᐃᕈᕐᔪᐊᖅ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᕐᑲᑎᒌᖏᑦ ᑲᑎᒪᔨᖏᑦ
- ᕿᑎᕐᒥᐅᓂ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑕ ᑭᒡᒐᖅᑐᐃᔨᖓ ᐃᐊᒪ ᖃᖅᑯᑕᖅ.

ᐅᕐᑲᐅᓯᒃᓴᑦ ᐊᒻᒪᓗ ᐊᐱᖅᑯᑎᒃᓴᑦ:

ᐅᓂᒃᑲᐅᓯᕐᑲᓚᐅᖅᑎᓪᓗᒋᒃ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓃᑦᑐᑦ ᓇᓄᐃᑦ ᒥᒃᓵᓄᑦ, ᑲᑎᒪᔨᐅᔪᑦ ᐅᕐᑲᐅᓯᕐᑲᓚᐅᖅᐳᑦ ᐊᑐᕐᑲᑦᑕᖅᓯᒪᔭᖏᑦ ᐊᕐᕌᒎᓕᖅᑐᓂᑦ ᓇᓕᒨᓂᕐᑲᖅᑐᒥᓂᐅᓪᓗᑎᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖓᑕ ᖃᐅᔨᓵᕆᓯᒪᔭᖏᑦᑕ ᖃᐅᔨᔭᒥᓂᐅᔪᓂᑦ. ᑕᒪᐃᓐᓂᓕ, ᑲᑎᒪᔨᐅᔪᑦ ᐊᖏᕈᑎᕐᑲᖅᓯᒪᕗᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖓᑕ ᖃᐅᔨᓯᒪᔭᖏᖕᓂᑦ ᖃᐅᔨᓴᓚᐅᖅᑎᓪᓗᒋᑦ. ᐊᑯᓂᐅᓂᖅᓴᖅ ᐅᕐᑲᕐᑲᑎᒌᓕᓚᐅᕆᕗᑦ ᑲᒪᒋᔭᐅᓂᖏᑦ ᐊᒻᒪᓗ ᕐᑯᖓᓯᕐᒥᐅᑕᓕᖅᓱᖅᑕᐅᕙᓐᓂᖏᑦ ᓇᓄᐃᑦ, ᐊᒻᒪᓗ ᑕᒪᓐᓇ ᐊᑐᖅᑕᐅᒍᓐᓇᕋᔭᕐᒪᖔᕐᒥᒃ ᓱᕗᓂᒃᓴᒥ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᕐᑲᑎᒌᖏᑕ ᐊᐱᖅᑯᑎᖏᑦ ᑭᐅᔭᐅᕐᑯᓪᓗᒋᑦ ᐱᓗᐊᖅᑐᒥᒃ ᐅᓯᒃᖅᑕᕐᓂᕐᒨᖓᑎᓪᓗᒋᑦ ᐊᒻᒪᓗ ᓴᓇᔪᓕᕆᔪᕐᑲᕐᑲᑦᑕᖅᑎᓪᓗᒍ ᐊᑦᑐᐃᓂᕐᑲᕋᔭᕐᓂᖏᑦ ᖃᐅᔨᔭᐅᒐᔭᕐᒪᑕ.

3.4 ᓇᐅᔾᔫᓂ ᑐᓴᕆᐊᕐᕕᕐᑲᓚᐅᖅᑎᓪᓗᑕ ᓇᐃᓈᖅᓯᒪᓂᖏᑦ

ᐅᓪᓗᖅ: ᐊᒃᑑᕝᕙ 26, 2020
ᓱᕐᑭᙳᔭᖅ: 18:10 – 21:50

ᑲᑎᒪᕐᑲᑕᐅᔪᑦ:
- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᓇᓄᓕᕆᔩᑦ ᒪ. ᑎᒃ, ᔭ. ᕗᐃᐅᕐ
- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐆᒪᔪᕐᓂᐊᖅᑎ ᐸ. ᐸᐸᑦᔪ
- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐊᕕᑦᑐᖅᓯᒪᔪᒥ ᐊᐅᓚᑦᑎᔨᐅᑲᐃᓐᓇᖅᑐᖅ ᔨ. ᓃᓕ
- ᓇᐅᔾᔫᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᕐᑲᑎᒌᖏᑦ ᑲᑎᒪᔨᖏᑦ
- ᕿᑭᖅᑖᓗᒻᒥ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᐃᒃᓯᕙᐅᑕᖅ ᔭ. ᕿᓪᓚᖅ
- ᓄᓇᕗᑦ ᑐᙵᕕᒃ ᑎᒥᖓ ᑐᑭᒧᐊᑦᑎᑦᑎᔨ ᐆᒪᔪᓕᕆᓂᕐᒧᑦ ᐸ. ᐃᖕᖓᐅᑦ
- ᓄᓇᕗᒻᒥ ᐆᒪᔪᓕᕆᔨᕐᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᑎ. ᓐᑎᓗ, ᓯ. ᒪᑉᓴᑏᖅ, ᑲᔨ ᐃᓐᒐᓚᓐ

ᐅᕐᑲᐅᓯᒃᓴᑦ ᐊᒻᒪᓗ ᐊᐱᖅᑯᑎᒃᓴᑦ:

ᐅᓂᒃᑲᐅᓯᕐᑲᓚᐅᖅᑎᓪᓗᒋᒃ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓃᑦᑐᑦ ᓇᓄᐃᑦ ᒥᒃᓵᓄᑦ, ᑲᑎᒪᔨᐅᔪᑦ ᐅᕐᑲᐅᓯᕐᑲᓚᐅᖅᐳᑦ ᐊᑐᕐᑲᑦᑕᖅᓯᒪᔭᖏᑦ ᐊᕐᕌᒎᓕᖅᑐᓂᑦ ᓇᓕᒨᓂᕐᑲᖅᑐᒥᓂᐅᓪᓗᑎᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖓᑕ ᖃᐅᔨᓵᕆᓯᒪᔭᖏᑦᑕ ᖃᐅᔨᔭᒥᓂᐅᔪᓂᑦ. ᑕᒪᐃᓐᓂᓕ, ᑲᑎᒪᔨᐅᔪᑦ ᐊᖏᕈᑎᕐᑲᖅᓯᒪᕗᑦ ᓄᓇᕗᑦ ᒐᕙᒪᖓᑕ ᖃᐅᔨᓯᒪᔭᖏᖕᓂᑦ ᖃᐅᔨᓴᓚᐅᖅᑎᓪᓗᒋᑦ. ᐊᑯᓂᐅᓂᖅᓴᖅ ᐅᕐᑲᕐᑲᑎᒌᓕᓚᐅᕆᕗᑦ ᖃᓄᖅ ᐅᓪᓗᒥᐅᔪᖅ ᓇᓐᓄᒐᓱᒍᓐᓇᖅᑐᑦ ᖃᑦᑎᓂᑦ ᓇᓕᐊᑦ ᓄᓇᓕᑦ ᐃᓕᔭᐅᔫᖑᒻᒪᖔᕐᒥᒃ ᐊᒻᒪᓗ ᐃᓚᖏᑦ ᓄᓇᓖᑦ ᕿᒥᕐᕈᔭᐅᕐᑯᔨᕗᑦ ᑕᒪᓯᒥᖓ ᐃᓕᐅᖅᑲᐃᓂᐅᕙᑦᑐᒥᒃ ᓇᓐᓄᒍᓐᓇᐅᑎᓂᑦ. ᐅᕐᑲᐅᑕᐅᓚᐅᕆᕗᖅ ᖃᓄᓕᐅᖅᑐᕐᑲᔫᖑᒻᒪᖔᖅ ᑕᒪᒃᑯᐊ ᓇᓐᓄᒐᓱᐊᕈᓐᓇᖅᑎᑕᐅᔾᔪᑦ ᐃᓕᐅᖅᑲᖅᑕᐅᔫᖑᓂᖏᑦ ᐊᓯᔩᖅᑕᐅᓗᑎᑦ ᑖᒃᑯᓄᖓ ᐊᕕᑦᑐᖅᓯᒪᔪᓂᑦ ᐆᒪᔪᕐᓂᐊᖅᑎᒃᑯᑦ ᑲᑐᔾᔨᕐᑲᑎᒌᖏᖕᓄᑦ.

3.5 ᓴᓂᕋᔭᖕᒥ ᑐᓴᕆᐊᕐᕕᕐᑲᓚᐅᖅᑎᓪᓗᑕ ᓇᐃᓈᖅᓯᒪᓂᖏᑦ

ᐅᓪᓗᖅ: ᐊᒃᑑᕝᕙ 27, 2020
ᓱᕐᑭᙳᔭᖅ: 19:15 – 21:15

ᑲᑎᒪᕐᑲᑕᐅᔪᑦ:
- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᓇᓄᓕᕆᔩᑦ ᒪ. ᑎᒃ, ᔭ. ᕗᐃᐅᕐ

- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐆᒪᔪᕐᓂᐊᕐᑎ ᕃ. ᒍᕌᓴᓐ
- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐊᕕᑦᑐᕐᓯᒪᔪᒥ ᐊᐅᓚᑦᑎᔨᐅᑲᐃᓐᓇᖅᑐᖅ ᔮ. ᓃᓕ
- ᓴᓂᕋᔭᒃ ᐆᒪᔪᕐᓂᐊᕐᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑦ ᑲᑎᒪᔨᖏᑦ
- ᕿᑭᖅᑖᓗᒻᒥ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᐃᒃᓯᕙᐅᑕᖅ ᔭ. ᕿᓪᓚᖅ
- ᓄᓇᕗᑦ ᑐᙵᕕᒃ ᑎᒥᖓ ᑐᑭᒧᐊᑦᑎᑦᑎᔨ ᐆᒪᔪᓕᕆᓂᕐᒧᑦ ᐸ. ᐃᖕᒐᐅᑦ
- ᓄᓇᕗᒻᒥ ᐆᒪᔪᓕᕆᔨᕐᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᑎ. ᓐᑎᓗ, ᓯ. ᒫᓴᖑᖅ, ᑲᔨ ᐃᓐᑲᓚᓐ

ᐅᖃᐅᓯᒃᓴᑦ ᐊᒻᒪᓗ ᐊᐱᖅᑯᑎᒃᓴᑦ:

ᐅᓂᒃᑳᓚᐅᖅᑎᓪᓗᒋᒃ ᓇᓄᓕᕆᔾᔩᒃ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓂ ᓇᓄᐃᑦ ᐊᒥᓲᓂᖏᑦᑕ, ᑲᑎᒪᔨᐅᔪᑦ ᐅᖃᐅᓯᖃᓚᐅᖅᐳᑦ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓂ ᐊᖑᓇᓱᒃᑲᑦᑕᕐᓂᑯᒥᓂᖏᑦ ᐊᒻᒪᓗ ᐊᕐᕌᒎᓕᖅᑐᓂᑦ ᖃᐅᔨᓯᒪᓕᖅᑕᖏᖕᓂᓗ ᓇᓗᓐᓂᖃᐸᓗᒃᓯᒪᓪᓗᑎᓪᓗ ᑕᒪᒃᑯᐊ ᓄᓇᕗᑦ ᒐᕙᒪᖓᑕ ᖃᐅᔨᓵᖅᓯᒪᔭᖏᑦᑕ ᖃᐅᔨᔭᒥᓂᐅᔪᓄᑦ. ᐃᓚᖏᑦ ᐅᖃᐅᓯᒃᓴᖃᓚᐅᖅᐳᑦ ᖃᑦᑏᓐᓇᑯᓗᐃᑦ ᓇᓄᐃᑦ ᓇᓐᓄᑦᑕᐅᓲᖑᒪᑕᒎᖅ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓂ ᓴᓂᕋᔭᖕᒥᐅᑕᓄᑦ.

3.6 ᐃᒡᓗᓕᖕᒥ ᑐᓴᖅᑕᐅᑎᑦᑎᓂᖅ ᓇᓄᐃᑦ ᓇᓄᖅᑐᖅᓯᒪᓂᖏᑦ

ᐅᓪᓗᖅ: ᐊᒃᑑᐳ 28, 2020
ᓱᕿᙳᔭᖅ: 18:40 – 21:42

ᑲᑎᒪᖅᑕᐅᔪᑦ:

- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᓇᓄᓕᕆᔾᔩᒃ ᒪ. ᑎᒃ, ᔭ. ᕗᐃᐅᕐ
- ᓄᓇᕗᑦ ᒐᕙᒪᖓᑦ–ᐊᕙᑎᓕᕆᔨᒃᑯᑦ, ᐊᕕᑦᑐᕐᓯᒪᔪᒥ ᐊᐅᓚᑦᑎᔨᐅᑲᐃᓐᓇᖅᑐᖅ ᔮ. ᓃᓕ
- ᐃᒡᓗᓕᒃ ᐆᒪᔪᕐᓂᐊᕐᑎᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᒌᖏᑦ ᑲᑎᒪᔨᖏᑦ
- ᕿᑭᖅᑖᓗᒻᒥ ᐆᒪᔪᓕᕆᔨᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᐃᒃᓯᕙᐅᑕᖅ ᔭ. ᕿᓪᓚᖅ
- ᓄᓇᕗᑦ ᑐᙵᕕᒃ ᑎᒥᖓ ᑐᑭᒧᐊᑦᑎᑦᑎᔨ ᐆᒪᔪᓕᕆᓂᕐᒧᑦ ᐸ. ᐃᖕᒐᐅᑦ
- ᓄᓇᕗᒻᒥ ᐆᒪᔪᓕᕆᔨᕐᔪᐊᒃᑯᑦ ᑲᑎᒪᔨᖏᑦ ᑐᑭᒧᐊᑦᑎᑦᑎᔨ ᐆᒪᔪᓕᕆᓂᕐᒧᑦ ᑎ. ᓐᑎᓗ, ᐆᒪᔪᓕᕆᔨ ᑲᔨ ᐃᓐᑲᓚᓐ

ᐅᖃᐅᓯᒃᓴᑦ ᐊᒻᒪᓗ ᐊᐱᖅᑯᑎᒃᓴᑦ:

ᐅᓂᒃᑲᐅᓯᖃᓚᐅᖅᑎᓪᓗᒋᑦ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓂ ᓇᓄᐃᑦ ᒥᒃᓵᓄᑦ, ᑲᑎᒪᔨᐅᔪᑦ ᐅᖃᐅᓯᖃᓚᐅᖅᐳᑦ ᓯᑯᐸ ᐊᓯᔾᔨᕐᓂᖓᓂᒃ, ᐅᓯᑲᖅᑕᕐᓂᕐᒥᒃ, ᐊᒻᒪᓗ ᐊᒥᓲᓂᖅᓴᐃᑦ ᓇᓄᐃᑦ ᑕᑯᔭᐅᕙᓕᕐᒪᑕ – ᖃᐅᔨᓯᒪᔭᖏᑦ ᓴᓂᕋᔭᑉ ᐃᒪᖓᓃᓐᓂᖅᓴᐅᕙᑦᑐᑎᑦ. ᐅᖃᐅᓯᖃᓚᐅᕐᒥᔪᑦ ᐊᑎᖅᑕᖅᑕᐅᖃᑦᑕᕐᓂᐅᔪᓂᑦ ᐊᒻᒪᓗ ᐊᑎᖅᑖᕈᓐᓇᐅᑎᓂᑦ, ᐊᒻᒪᓗ ᖃᓄᖅ ᐱᔪᓐᓇᕋᔭᕐᒪᖔᑕ ᐊᒥᓲᓂᖅᓴᓂᑦ ᐊᖑᔭᐅᔪᓐᓇᖅᑐᓂᑦ ᓴᓂᕋᔭᑉ ᑕᓇᐅᖓᓂ. ᑕᒪᐃᓐᓂ, ᐃᓚᒋᔭᐅᔪᑦ ᐊᕆᕈᑎᖃᓚᐅᖅᐳᑦ ᖃᐅᔨᓵᑉ ᓴᖅᑭᖅᓯᒪᔪᑦ ᖃᐅᔨᔭᒥᓂᐅᔪᓂᑦ.

4.0 ᑕᒪᐃᓐᓂ ᓄᓇᓕᐅᔪᓂᑦ ᑐᓴᓇᐊᕐᕕᖃᖅᑎᓪᓗᑕ ᓇᐃᓈᖅᓯᒪᓂᖏᑦ

ᑐᓴᓇᐊᕐᕕᖃᖅᑎᓪᓗᑕ ᑕᒪᐃᓐᓂ ᓄᓇᓕᐅᔪᓂᑦ ᓇᓐᓄᒐᓱᐊᓲᑦ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓂ ᓇᓪᓕᑭᑕᖅᑐᑎᑦ ᐅᖃᐅᓯᖃᖅᑎᑕᐅᕙᓚᐅᖅᐳᑦ, ᖃᓄᑐᐃᓐᓇᖅ ᐅᖃᓪᓚᒍᒪᔭᕐᒥᖕᓂᑦ ᐅᖃᐅᓯᖃᕈᓐᓇᖅᑐᑎᑦ ᑕᒪᐃᓐᓂ ᑲᑎᒪᖅᑕᐅᔪᑦ ᐅᖃᐅᓯᖃᕈᓐᓇᖅᐸᓚᐅᖅᐳᑦ, ᐊᐱᖅᓱᕈᓐᓇᖅᑎᑕᐅᓪᓗᑎᑦ, ᐊᒻᒪᓗ ᐅᖃᓪᓚᓪᓗᑎᑦ. ᑲᑎᒪᖅᑕᐅᔪᑦ ᑐᑭᓯᒋᐊᖅᑎᑕᐅᕙᓚᐅᖅᐳᑦ ᖃᓄᐃᑦᑐᓂᑦ ᐅᖃᐅᓯᖃᕐᓂᐊᕐᒪᖔᑦᑕ ᐊᒻᒪᓗ ᑐᑭᓯᐅᒪᓪᓗᑎᑦ ᖃᐅᔨᓴᕐᓂᑦ ᓴᖅᑭᖅᓯᒪᔭᖏᖕᓂᑦ. ᐱᒻᒪᕆᐅᓂᖅᓴᑦ ᐅᖃᐅᑕᐅᕙᓚᐅᖅᑐᑦ ᓄᓇᓕᐅᔪᓄᑦ ᑐᕌᖓᔪᑦ ᐃᑭᕋᓴᑉ ᐃᒪᖓᓂ ᐅᑯᐊᖑᓪᓗᑎᑦ:

1) ᐊᖏᖃᑎᖃᖅᑐᑎᑦ ᖃᐅᔨᕐᒥᓂᕐᓂᑦ ᓇᓄᐃᑦ ᐊᒥᖒᓂᖏᑦ ᐊᓯᔾᔨᓗᐊᖅᓯᒪᙵᒪᑕ–ᐊᓯᔾᔨᓗᐊᕌᓗᒃᓯᒪᙵᑦᑐᑦ ᒪᓕᑦᑐᒋᑦ ᓄᓇᒥ ᑕᑯᔭᐅᖃᑦᑕᕐᓂᑯᒥᓂᖏᑦ–ᑕᐃᒪᙱᓂᑦ ᑭᖑᓪᓕᖅᐹᒥᒃ ᖃᓪᓗᓇᕐᔫᖕᖓᑦ ᖃᐅᔨᓴᐅᓯᖏᑦ ᒪᓕᑦᑐᒋᑦ ᖃᐅᔨᓵᒥᓃᑦ 1998-2000–ᖑᑎᓪᓗᒍ, ᐊᒻᒪᓗ

2) ᐃᑭᕋᓭ ᐃᒪᖓᓂ ᓇᓄᑦᑕᐅᒐᓱᐊᕈᓇᖅᑐᑦ ᐃᓕᐅᖅᑲᖅᑕᐅᓂᖏᑦ ᐃᓱᒫᓘᑕᐅᒪᙳᖕᒪᑦ.

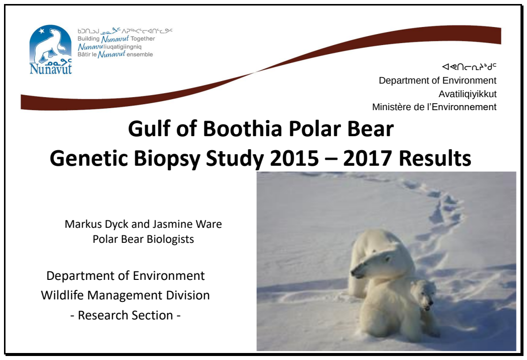
ᐱᒪᙳᐅᙱᓐᓂᖅᓵᓪᓗ ᐅᖃᐅᑕᐅᕙᓚᐅᖅᑐᑦ, ᐅᖃᐅᑕᒥᓂᐅᓪᓗᑎᑦ ᓄᓇᓕᐅᔪᓄᑦ ᐃᓚᖏᖕᓄᑦ ᑭᓱᐊᓂᓕ ᑕᒪᐃᓐᓅᙱᑦᑐᖅ, ᐅᖃᐅᓯᖃᓚᐅᖅᐳᑦ ᓄᐊᑕᐅᓗᑎᑦ ᓅᐸᓪᓕᐊᓂᖏᑦᑕ ᑮᓕᓯᓂᐊᖅᑕᐅᓯᒪᔪᑦ ᑐᑭᓯᐊᕈᑎᖏᑦ ᓇᓗᓇᐃᖅᓯᖁᓪᓗᒋᑦ ᐊᑦᑐᐃᓂᖃᕈᓇᕐᓂᖏᑦ ᐱᕙᓪᓕᐊᔪᓕᕆᓂᐅᕙᑦᑐᑦ ᐊᒻᒪᓗ ᐅᓯᒃᖅᑕᕐᓂᐅᔪᑦ ᐊᒻᒪᓗ ᐊᑎᖅᑕᑗᓂᑦ ᓇᓄᒐᓱᐊᕈᒪᖃᑦᑕᖅᑐᑦ.

ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ ᐊᓯᔾᔩᖁᔨᓚᐅᙱᓚᖅ ᑲᑎᓕᒫᖅᑐᒋᑦ ᐊᖑᔭᐅᔪᓇᖅᑐᑦ ᐊᒥᖒᓂᖏᖕᓂᑦ ᑕᐃᑯᖓ ᐃᑭᕋᓭ ᐃᒪᖓᓄᑦ ᒪᓕᑦᑐᒋᑦ ᖃᐅᔨᓵᒥᓃᑦ ᓴᖅᑭᓐᓂᖏᑦ ᐊᓯᔾᔨᓗᐊᖅᓯᒪᙱᓐᓂᖏᖕᓄᑦ ᐊᒥᖒᓂᖏᑦ ᓇᓄᐃᑦ. ᑕᒪᐃᓐᓂ ᓄᓇᓕᐅᔪᑦ ᐊᖏᕈᑎᖃᖃᑦᑕᖅᓯᒪᓚᐅᕐᓂᖏᖕᓄᑦ ᖃᐅᔨᓵᒥᓃᑦ ᓴᖅᑭᖅᓯᒪᔭᖏᖕᓄᑦ, ᐊᑭᕋᖅᑐᓗᐊᕌᓗᒃᑐᖃᓚᐅᙱᓚᖅ ᑕᒪᕝᓱᒧᖓ ᑐᒃᓯᕋᐅᑎᒧᑦ. ᐃᓄᐃᑦ ᖃᐅᔨᒪᔭᑐᖃᖏᑎᒍᑦ ᖃᐅᔨᓴᖅᑐᖃᐃᓐᓇᕐᒪᑦ ᐃᑭᕋᓭ ᐃᒪᖓᓂ ᖃᐅᔨᔦᒥᑎᑦᑎᒍᑕᐅᔦᓇᑖᖅᑐᓂ ᐊᖑᓇᓱᒃᑏᑦ ᐊᒻᒪᓗ ᑕᒪᐅᙵᖅᐸᑦᑐᑦ ᖃᐅᔨᓯᒪᔭᖏᑦ ᒪᓕᑦᑕᐅᓗᑎᑦ ᓇᓄᐃᑦ ᓱᑯᑎᐊᓃᓱᖑᓂᖏᖕᓄᑦ ᐅᕝᕙᓘᓐᓃᑦ ᐊᒥᖒᓂᖏᖕᓄᑦ.

ᐃᓚᖓ ᐱᕐᔦᐊᖑᔦᖅ ᐅᖃᐅᑕᐅᓚᐅᖅᑐᖅ ᑐᓴᕆᐊᕐᕕᖃᖅᑎᓪᓗᑕ ᓇᓗᓇᐃᒃᑯᓯᖅᓱᐃᖃᑦᑕᕐᓂᑦᑕ ᐃᓕᐅᖅᑲᖅᑕᐅᓲᖑᓂᖏᑦ ᕿᒥᕐᕈᔭᐅᒃᑲᓐᓂᕆᐊᖃᒪᑦ ᖃᐅᔨᒪᓇᑦᑎᐊᕐᑯᓪᓗᒍ ᓇᓕᒍᑦᑐᒃᑯᑦ ᑲᒪᒋᔭᖃᕋᔭᕐᑕ ᐊᒻᒪᓗ ᐊᒥᖒᓂᖏᑦ ᐊᔾᔨᒌᔦᒥᒐᔭᕐᒪᑕ ᓇᓄᒍᓇᖅᑐᑦ ᓄᓇᓕᐅᔦᑦ ᑕᐃᑲᙱᑦ ᐃᑭᕋᓭ ᐃᒪᖓᓂ ᓇᓄᖃᑦᑕᓱᑦ. ᑕᒪᓇ ᐅᖃᐅᑕᐅᓗᐊᓚᐅᖅᐳᖅ ᓄᓇᓕᐅᔪᓄᑦ ᓇᓄᒐᓱᖕᓱᓄᑦ ᑕᒪᒃᑮᓐᓂᒃ ᕿᑎᕐᒥᐅᑦ ᑕᕆᐅᖓᓂ ᐊᒻᒪᓗ ᐃᑭᕋᓭ ᐃᒪᖓᓂ ᓇᓄᐃᑦ ᐊᒥᖒᓂᖏᖓ. ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦᑕ ᑭᒐᖅᑐᐃᔩᖏᑦ ᐅᖃᐅᓯᖃᓚᐅᖅᐳᑦ ᐱᓕᕆᐊᕆᔭᐅᖒᓂᑦ ᐊᒻᒪᓗ ᑲᒪᒋᔭᖃᖃᑦᑕᕆᐊᖃᕐᓂᖏᖕᓂᑦ ᑖᒃᑯᐊ ᑎᒥᐅᔦᑦ ᐋᖅᑮᖅᑯᓪᓗᒋᑦ ᑕᒪᒃᑯᓂᖓ ᓂᕝᖓᑖᑦ ᐃᓕᐅᖅᑲᖅᑕᐅᔾᔦᑎᖏᑦ ᓇᓄᒐᓱᐊᕈᓇᐅᑏᑦ ᓄᓇᓕᐅᔦᓂᑦ. ᓄᓇᕗᑦ ᒐᕙᒪᖏᑦ ᓇᓗᓇᐃᔭᐃᓚᐅᖅᐳᑦ ᐊᐅᓚᔾᔦᓯᖓᓂᑦ ᑖᒃᑎᒎᓈᕐᓗᑎᑦ ᐊᕙᑦᑐᖅᓯᒪᔦᓂᑦ ᐆᒪᔦᓕᕆᔩᒃᑯᑦ ᑲᑐᔾᔨᖃᑎᑰᖏᑎᒍᑦ ᐊᒻᒪᓗ ᑐᑭᒧᐊᑦᑎᑦᑎᒎᓐᓇᕐᓂᕋᖅᑐᑎᑦ ᐅᕝᕙᓘᓐᓃᑦ ᑐᑭᓯᒋᐊᖅᑎᑦᑎᒃᑲᓐᓂᕈᓐᓇᖅᑐᑎᑦ ᓇᓕᐊᓐᓄᑐᐃᓐᓇᖅ ᐱᓕᕆᐊᖃᕈᒪᔦᓄᑦ ᓄᓇᓕᐅᔦᒧᑦ.

Appendix 1: Complete Consultation Presentation of the Gulf of Boothia Polar Bear Study Results 2015-2017

Slide 1



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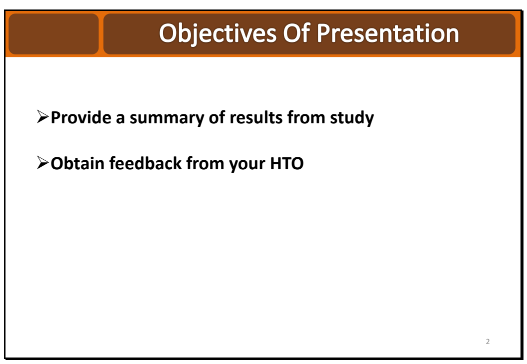


Slide 3

Background

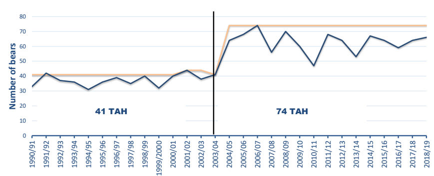
- First mark-recapture study between 1973-78
  - MC and GB treated as one unit, estimate of 1,081
- GB estimate increased to 900 in mid-90s based on local knowledge and biased sampling
- MC estimate decreased from 900 to 700 based on local knowledge in mid-90s
- Population boundaries in 1995 and 2001

3

Slide 4

Background

- 1998-2000--Mark-recapture estimate for GB was 1592 bears
- TAH of 41 for GB until 2003/2004
- Increased TAH to 74 bears in 2004/2005
- Average harvest per year: 63 bears since 2005



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Slide 5

Background

- Population status unknown (stable? increasing?)
- Population boundaries of MC/GB/LS?
  Inuit Qaujimajatuqangit/genetics suggest movement between both units

5

Slide 6

Goals of study

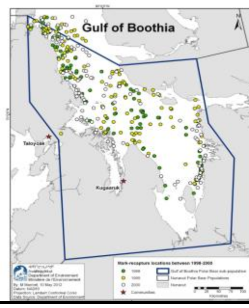
- ➢ **Need for new information – current data was deficient**
  - ➢ **Re-assess population abundance**
  - ➢ **Evaluate population boundaries/movements of bears**
  - ➢ **Provide information for review of Total Allowable Harvest (TAH)**
  - ➢ **Observe effects of changing sea-ice conditions**
  - ➢ **Assess potential impacts of industrial activity**

6

Slide 7

Study method choices

- ➢ **Co-management partners indicated concern about drugging & handling bears**
  - **Explore alternative population assessment methods**
  - **Better reflect Inuit societal values**
- ➢ **Balance with analysis needs –to properly monitor population**

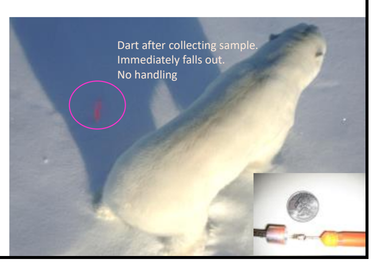


Slide 8

Study method chosen

➢Co-management partners chose, and GN supported, less invasive choice:

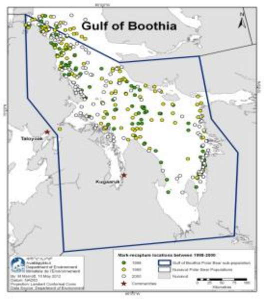
Genetic mark-recapture (biopsy sampling, no physical handling)



Slide 9

Genetic capture mark-recapture study goals

- Estimate polar bear abundance in GB
- Compare with 1998-2000 estimate
- Compare information on reproduction, survival
- Cannot estimate movement or boundaries with this method



Slide 10

Study funding and support

Environment and Climate Change Canada
Environnement et Changement climatique Canada

Nunavut

Nunavut General Monitoring Plan

WWF

QIKIQTAALUK WILDLIFE BOARD

HTOs from Gjoa Haven, Igloolik, Kugaaruk, Naujaat, Taloyoak, Sanirajak

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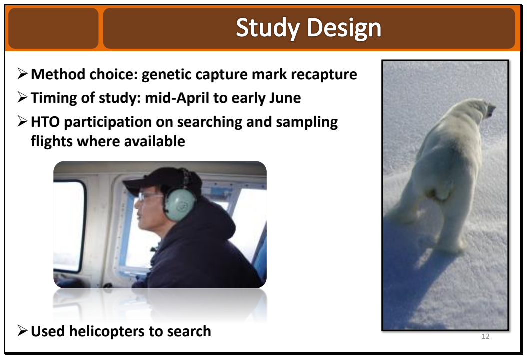
Slide 11

Study Design

Community Participation

- Survey design and method choice - 2013
- Survey observers – 2015 through 2017
- Review & evaluation of results - 2020

Slide 12



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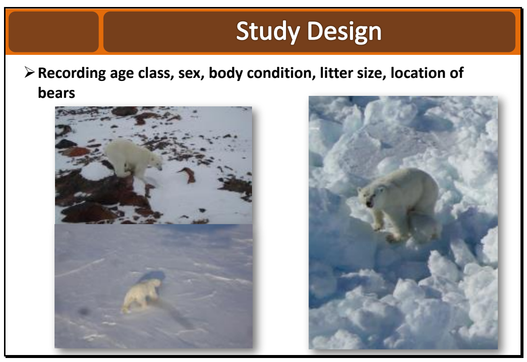

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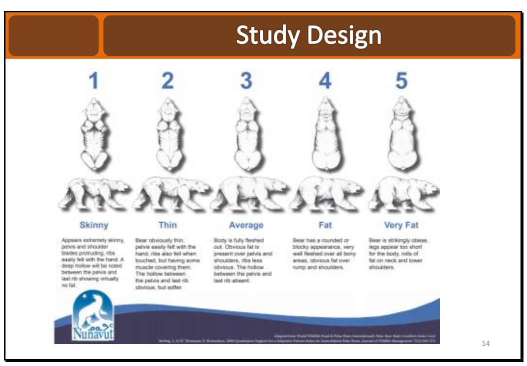

Slide 15

Study Design

- Collected small tissue samples for genetic analysis (to genetically identify and "mark" an individual)
- No cubs-of-the-year sampled
- No drugging, no collaring
- No specific ages or samples for other studies (e.g., contaminants)

Slide 16

Study Design - Analysis

- Included all available information for analysis:
  - Genetic mark-recapture (biopsy) information 2015-2017
  - 1998-2000 capture mark-recapture information
  - Harvest recoveries (e.g., when an ear tag/lip tattoo is recovered by a hunter) 1976-2017
  - 1976-1997 capture mark-recapture information

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Slide 17

Analysis Goals

- Use all information to determine:

1. Trends in abundance from 2000-2017
2. Survival rates of different age classes and sexes over time
3. Reproductive parameters such as size of litters, litter rate per adult female (how productive are the females/population)
4. Population growth rate – determined using survival rates and litter production rates
5. Evaluate body condition of bears across the entire GB area

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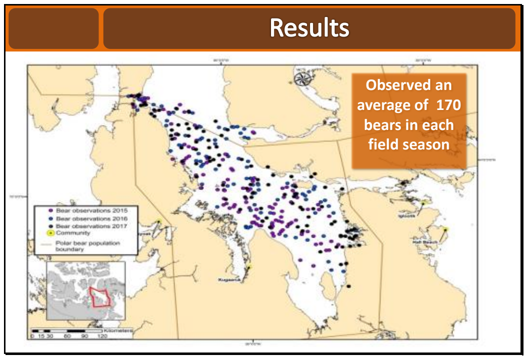
Slide 18



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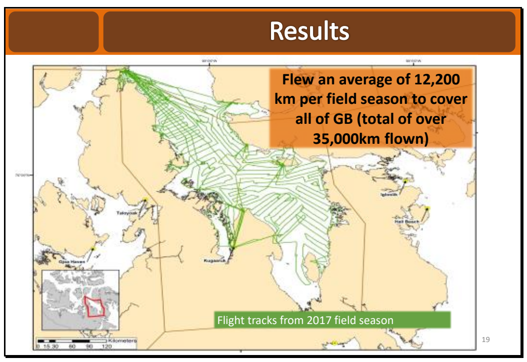

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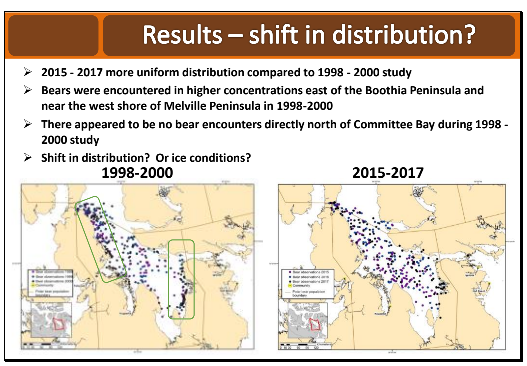
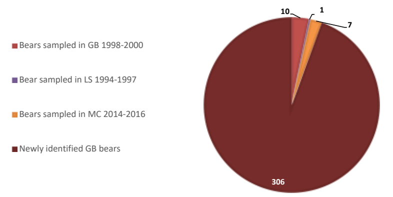


Slide 21

Results – mark-recapture samples

- 324 individual bears identified through genetic biopsy sampling using DNA
- 10 bears were previously marked in 1998-2000 study
- 1 bear previously marked in Lancaster Sound study in 1994-1997 study
- 7 bears marked in M’Clintock study 2014-2016



21

Slide 22

Results – body condition

- Bears were in better condition (fatter) in 2015-2017 compared to 1998-2000
  - 30% chance of poor Body condition (1 or a 2 score) in 1998-2000
  - 7% chance of poor Body condition in 2015-2017
- Why? Your thoughts?

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Slide 23

Results – Reproduction

- What does “reproduction” mean? What do scientists look at?
- Litter size
  - data from 1998-2000 and 2015-2017
    - 99 females observed with COY litters
      - COY litter size: 1.61
    - 80 females observed with Yearling litters
      - Yearling litter size: 1.53

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Slide 24

Results – Reproduction cont.

- Number of offspring per adult female

1998-2000
- 0.51 COYs/adult female
- 0.37 yearlings/adult female

2015-2017
- 0.43 COYs/adult female
- 0.36 yearlings/adult female

- 85% chance that COYs per adult female was less in 2015-2017 compared to 1998-2000

- Number of yearlings per adult female is important because it shows how many cubs-of-the-year survive to be yearlings
  - good measure of reproduction

- The GB subpopulation has healthy reproduction

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Slide 25

Results – Survival

- Females and males separated
- Adults and subadults separated

- Data support similar survival across time

- Unsurprisingly, subadults have the lowest survival of these groups with subadult males lower than subadult females.

- There were fewer adult males than expected, but that is likely due to the past harvest with a 2 males for 1 female harvest system

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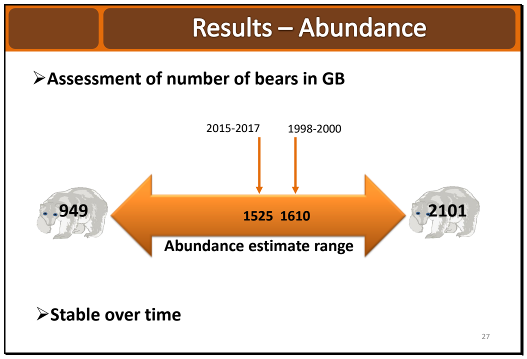
Slide 26

Results – Population growth rate

- Population growth rate similar to assessments from the last study
(growth rate is simply the difference between what is added through births minus the deaths and takes into account how animals survive)

- Growth rate indicates strong potential for growth

Slide 27



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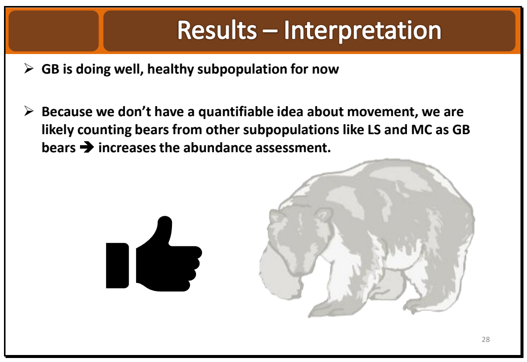

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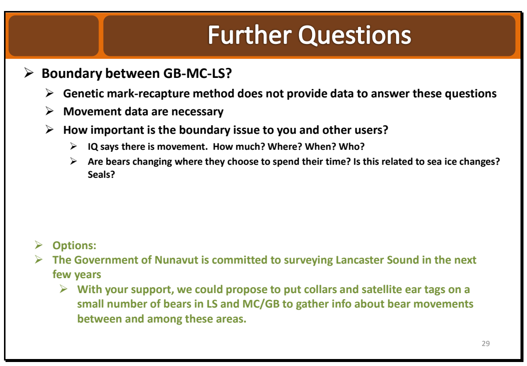

Slide 30

Further Questions

- Do you agree that the number of bears stayed relatively the same over time?
- What did you observe in the bears' body condition over time?
- Are there enough bears to harvest? Are there too few? Too many?
- Is there anything special that you observed and wanted to share with us?
- Where do you agree/disagree with our findings?

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Slide 31

GN Recommendation

- The GB subpopulation has remained stable – we recommend no change in TAH
- What are your thoughts about the recommendation?

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Slide 32

Further Questions? - Thank you

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Appendix 2: Complete Consultation Summary of the Gulf of Boothia Community Consultations

Nunavut Community Consultations on the results from the 2015-2017 Gulf of Boothia Polar Bear Study

October 20-28, 2020

HTOs Consulted:
Gjoa Haven
Taloyoak
Naujaat
Kugaaruk
Igloolik
Sanirajak

Summary of Consultations:

A: Gjoa Haven

October 20, 2020

Time Start: 18:50

Time End: 21:15

Participants:

Enuk Pauloosie
William Aglukkaq
James Qitsualik via cell phone video chat
Simon Komangat
Jimmy Qirqqut
Roger Ekilik
Ben Putuguq
Jimmy Pauloosie
Ralph Porter Sr.
J. Skillings – GN-DOE
K. Metheun – GN-DOE
M. Dyck – GN-DOE
J. Ware – GN-DOE
Jacob Keanik - translator

- Markus introduced option to go over background of MC/GB or skip it? Question to the board---what would you prefer?

- Ralph: we don't need super detailed on the background so you can go through it quickly.

Background slides: review – our objective to provide new data for the co-management partners and the NWMB to make decisions on setting harvest levels. We are here to hear feedback.

Study methodology: review, no questions

Community participation: review; no questions

Study design: review; no questions

Study design analysis: explained why the amounts of data matter for getting the results; no questions

- Ben: Years ago, when the moratorium came I was one of the Board members back then and remember it. We used to go all the way to Prince of Wales Island before the quota system was put in place to harvest as much as we could.

- Markus: thank you, I'd like to hear about the ice back then.

- Ben: it's totally different. There isn't any ice really.

GB Results:

- Willy—the board isn't that interested in Gulf of Boothia because it is very rare that we go there to hunt. The ice conditions are too dangerous. Young hunters do not have any knowledge about that area. We are not that interested in this population.

- Ralph said if a bear doesn't want to show up, you can't see it. It is the knowledge of our ancestors.

- Ben: when our young hunters go to Gulf of Boothia, they don't have a clue about the ice conditions and it's very dangerous…the ice can just take them.

- Willy: that actually happened with a sport hunting group—the ice split and took the hunters out to sea.

- Ben: the hunters that were taken the sport hunters, I was there and I managed to get home before the ice split. The younger generation doesn't have a clue how the ice conditions.

- Markus: I can go over GB very quickly. It is my job; I have to tell you about it.

GB Results/TAH recommendation: Because its stable and there are no changes that we can detect, we are recommending that there is no change to the TAH. If the communities feel differently—want more meat or public safety is an issue, then that is an opportunity to discuss how the TAH could change.

- Willy: It doesn't affect us.

- Markus: That's pretty much it for the presentation for the MC/GB. Are there any questions that the community here has with regards to GB/MC/LS boundaries and movements? We can hear these comments and try to see if they can be incorporated into our future work. We are doing LS and are going to be analyzing those samples in the next 4-6 years and we will let you know what we find—were there MC bears up there that we marked in 2014-2016.

- I know there is no desire from this community for collaring, but there are some communities that are interested in movements because they are wondering about climate change, increased development, increased shipping. For example, NTI approached me once about impact on bears from a development project, but

I couldn't answer those questions because we don't have movement data. For now, maybe this is okay, but this may be important in the future.

- If there are specific questions from the communities or specific areas of interest, bring those forth to the regional wildlife board/NWMB priority—those priorities help the GN determine how they focus their resources and money along with our mandate to get updated information for the polar bear subpopulations.

- **Question Simon**: Peter DeGroot seems to be doing a lot of research in the last 20 years. What does he do with you guys?

- **Answer Markus**: He works for a university, not affiliated with GN. He is part of a big project, multiple universities, maybe 25 organizations supporting BearWatch – Peter is involved, but he is not the lead. It is looking at genetics, bacteria, developing a kit for fecal sampling. A lot of different projects but Peter is a tiny part of the bigger project. The GN supported Bearwatch because there are bits and pieces of this project that could help for management that we could not collect alone.

- **Question Willy:** Is this work they are doing helping us? It is helping the government…but what is it doing for us?

- **Answer Markus**: the samples are still being analyzed…from the many samples they are trying to determine if it's possible to see contaminants and genetics. As the GN, we could not do it. The idea was to be able to harness the resources of universities and their labs to gather information and develop potential new methods for non-invasive health monitoring of the bears.

- **Answer Jasmine:** also, we don't know if what BearWatch has proposed will work –it was an idea that had to be tested. The idea was to develop less invasive technologies and methods, but will it actually work? Don't know.

- **Question Ralph**: so whatever Peter does, it is not affiliated with the NWMB?

- **Answer Markus**: that is correct. Whatever Peter does is not counting bears and they are not primarily responsible to providing info to NWMB for management decisions.

- Willy: they are mostly doing contaminants, health, same as they are doing with the fish.

- Roger: Hunting bears in GB is too far—takes a lot of gas and people don't go there. Mostly MC.

- Markus: the GN is not responsible for allocation—the KRWB does that. For GB, all 3 regional wildlife boards are involved for GB—they all have to talk to each other. That requires a lot of discussion, I think. I think it requires involvement of all the RWOs.

- Ben: Bears in MC once it starts to freeze up, they start to come to town…that's because they are not being harvested due to the moratorium. Even during the summer, there are bear sightings now.

- Markus: Also probably not that much noise and traffic going out so they aren't afraid.

- Ben: it's because they aren't being harvested or disturbed by machines. They are even sighted far inland on King William Island. The population is healthy.

- Willy: Another thing is that between here and Taloyoak, there used to be a lot of traffic between the two communities even in the spring. Lately they have been seeing bears between here and Taloyoak. Seeing a lot of bears tracks, even wolf and wolverine around Clarence islands. Packs of wolves on the sea ice – Markus you've seen the wolves come into camp, two of them. Even going up to Boothia. But there are packs of wolves and they can also kill polar bears, from experience.

- Markus: the wolves could have an impact on the offspring of polar bears

- Willy: bottom line is that we saw a lot of bear sign and the 3 bears we got were very healthy and over 10 ft.

- Markus: that lines up with what we are seeing –that is really nice to hear.

- **Question Simon**: you were going to talk about sea ice Markus?

- **Answer Markus**: I think the way we looked at sea ice was that we included it our body condition analysis and how that might affect the body condition. We know from satellite imagery from last 30 years that ice has changed. We didn't do full analysis from satellite imagery or ice analysis on ice specifically. I don't' know if that's answering your question.

- Simon/Willy nod it was sufficient answer

- Ben: Used to have icebergs that even have cracks and there used to be abundance of seals and there were ice packs and they were easy to spot. Nowadays the bears are moving more because there are less icebergs –we don't see the icebergs anymore.

- Willy: we don't see much ice anymore.

- Markus: agree with the satellite imagery—barely any ice in MC channel in fall

- Willy: people that used to go harvest belugas to Prince of Wales, but as soon as they get westerly winds the ice would get pushed in and they'd be stuck for weeks---they have a hard time getting through because of ice, but now no problem…20 years a big difference in sea ice.

- **Question Markus**: that's the other question I have---if this northern area is free of ice, what's going on with bears? Do they stay on the little ice? Do they go on land? What do you guys see when you travel int eh summer?

- **Answer Ben**: northwest king William island, bears would be swimming miles away from sea ice and can catch seal in open water. They're still hunting even if it's free of ice. They're always traveling even when it's full of ice.

- Willy: During the summer months, July/Aug prince of Wales, I stood and counted 33 bears in Cunningham bay—this happens when the beluga whales are coming in with their calves.

- Markus: to Willy---we tried to figure something out with you remember?

- Willy: polar bears going after belugas staying in the mouth of the bay to catch them.

- **Question James** (via video on smartphone): Going to that old MOU, remember we had that issue with Taloyoak with them "stealing" our tags when the TAH went to 12. But maybe this is a RWO issue.

- **Answer Markus**: You are correct, this is definitely a point to bring up with the RWO.

- **Question James**: I'm trying to make the numbers more equal. I'm just trying to make the communities have a fair trade. If we want a higher TAH is that NTI?

- **Answer Jasmine**: that would be the NWMB to raise the TAH. The RWO decides how to allocate the TAH.

- **Question Willy**: Why is Taloyoak involved in the TAH for MC when they were not involved when we signed the MOU. Taloyoak can harvest from MC but Gjoa can't get to GB. What are bears considered when they are harvested—MC/GB

- **Answer Markus**: The boundary goes right through Taloyoak

- Willy: so if Taloyoak has a defense kill is that considered MC

- Ben: there was a big male harvested as defense and counted as GB -- happened last year

- Markus: that is something that Kevin/Jack look into

- Kevin: okay

- **Question Jack**: isn't within 30km of the management unit a buffer zone?

- **Answer Markus**: yes, there is a 30 km zone that they can go on both sides.

- Willy: to board---do you have any concerns on bears?—time to ask

- **Question**: ---is there going to be another polar bear survey again some time soon?

- **Answer Markus**: that is a very good question---we have seen with our experience that having these long empty data periods of many many years, it makes analysis very very challenging.   Not just in MC, all the populations this is a struggle having these long gaps. That was the old system because it worked for money resources, bears are long-lived, and it was the management and monitoring plan initially, but now we have realized that 15–20-year gaps are not good for analysis. Ideally, we'd like to be back in a few years for a one-year effort to sample bears in MC. That would help us get better data and get better estimates for survival. That is where the HTO comes in—if you make it a priority and identify it to the RWO and NWMB---say it's not okay to have long huge gaps for population assessments---that helps then us and the GN to make our case to allocate time/funding.

- **Question Kevin**: question regarding the 30 km buffer zone – where did that come from?

- **Answer Markus**: that was originally from the MOU—because bears don't respect boundary and hunters may not have always a precise location.

- Willy: like the Hadley Bay population and with NWT

- **Question Jack**: does that get carried forwarded from the MOU into the new polar bear management plan?

- **Answer Markus**: not sure, probably, don't have it memorized, can check. Just want to thank you for allowing us to come in person and giving us your time. Just because we talking here, doesn't mean that we have to end the conversation…we are open for contact and can help any way we can.

- **Question Simon**: how often could you come to Gjoa Haven?

- **Answer Markus**: 2013 and now 2020 – so maybe twice in 7 years? We rotate through the 12 subpopulations – we have a better chance to make it to the regional AGM and we are certainly open to joining via video conference on an HTO meeting if you have interest or questions for us.

- Jasmine: Unfortunately, you are looking at all the biologists for Nunavut. What we'd like to do personally isn't always what we can do realistically. We would ideally be able to make regular visits and updates for all communities.

- Simon: reason I'm asking is because we've been waiting to hear since 2017

- Markus: I'll tell you the same thing I told Cambridge Bay—it was a long time to wait for these results I admit, it is not ideal --- MC was challenging because the data was so sparse, analysts really struggled to analyze the little bit of data, ransomware, and COVID. I wanted to be able to stand behind these numbers and support them and so it took longer than we predicted. We apologize for that.

- **Question Wally**: another comment/concern I'd like to mention is did you do MC then to GB? --

- **Answer Markus**: we did them at the same time

- **Question Wally**: could you do a survey in the summer?

- **Answer Markus**: No---because there is still ice enough for bears, but not enough for pilots. The pilots don't want to fly over open water and bears would still be in the water and on ice pans during that time—we would not be able to do proper coverage of the area. You'd have to have really low ice and bears would have to be on shore.

- Wally: it is good to hear that we are having a recommended increase and the population is healthy. Of course, we'd like a bit more. A lot of activity and population is increasing.

- End of meeting

B: Taloyoak

October 21, 2020

Start: 17:45

End: 20:15

Participants:

Joe Ashevak, Chairperson HTO
Tommy Aiyout
Bruce Takolik
Jayko Neeveacheak
Kovalak Kootook
J. Ware – GN-DOE
M. Dyck – GN-DOE
K. Methuen – GN-DOE
D. Anavilok – GN-DOE

- Joe: Board wanted to know whether there was going to be a public meeting and were under the impression that there was going to be a public meeting. It appears that Jimmy the manager forgot to bring this up to the GN (Joe asked Jimmy if he let the GN know that the HTO wanted a public meeting and Jimmy indicated that he forgot). *Note, the GN did not receive any notification or request for a public meeting prior to this meeting.

- This is very important to us and we can wait—sometime this winter would be good. We really want this and have been waiting a long time. M'Clintock is very important. Is this a possibility to do?

- Markus/Jasmine – This is possible to do, but we don't know if it is likely and we cannot commit at this moment because we need to discuss with our supervisors and figure out a schedule.

Background slides: review; no questions

Study design/methods slides: passed around biopsy dart; answered a few questions regarding how the dart sampled the bear. No other questions.

Community participation slides: review; no questions

GB results:

- **Question Joe**: what is the TAH for GB?

- **Answer Markus:** 74

- **Question Jayko:** are you guys getting new equipment –like cameras and stuff to take pictures that have the built in ability to see how big the bear are?

- **Answer Markus:** I think I know what you're saying and it might be a bit more complicated to determine actual size from a picture -- we would need to know altitude, distance, focal length. It might be possible to calculate size and do that. We could look into that.

- **Question Tommy**: talking about quota –all those communities Gjoa, Igloolik, Sanirajak, What the quota like before MC was shut down?

- **Answer Markus:** it was 42 until 2003/2004. It was increased to 74 in 2004/2005 because the study in 1998-2000 showed ~1600 bears instead of 900. I was around at that time of the moratorium in MC that communities were given a few tags for GB to preserve traditions during that moratorium and low harvest in MC.

- Joe: that was a big jump from 42 to 74.

- Markus: yes, I don't know how the recommendation went, but it seems that the 74 has been okay because the population has remained stable, though there may be some environmental changes that have helped the population---like the sea ice thinning/reduction in multi-annual ice and becoming better habitat for fish/seals/algae/etc.

- **Question Jimmy**: no colons being collected anymore?

- **Answer Jasmine:** correct, that was a collaborator project and they had funding for only a set number of years. That funding has run out and now they are working on analyzing the data. I am not sure when reports/information will be ready, but reports will be sent to communities with what they find.

- **Question Jimmy:** about credits? If we want to have a sport hunt, can we use our credits for sport hunts?

- **Answer Kevin:** Yes, that is not a problem. However, keep in mind that we haven't approved any outfitter licenses due to Covid. But, we can help support you for that if you have questions. Not much going on with sport licensing this year still with covid.

- **Question David A.:** with the feces and Peter DeGroot study ---maybe ask the HTO to make sure there was approval – we're not sure there was approval.

- **Answer Markus:** I'm pretty sure that all Bearwatch research had permits—they would have gone through our department.

- **Question Kevin:** do you know when that permit expires?

- **Answer Markus**: I'm not sure—probably multi-year

- Kevin: during the research permit review period that is a good time to bring up any concerns or comments---that is the time to bring that forward and decide if you support. If you don't say anything, it is assumed to be approval from the HTO.

- **Question Bruce**: Is it mostly the GN that counts bears or do other people do it?

- **Answer Markus**: mostly it is GN, but sometimes we have to have help because it is only me and Jasmine. There are a few people that have lots of experience that we bring on to help out on big projects. I'm in charge of the program and I only get people with experience to do the work. And there are locals involved—it's not just the biologists.

- Following the meeting after Jasmine/Markus left, Kevin remained for other agenda items and it was mentioned again that there was **a lot of disappointment that the public would not be hearing these results**. Kevin reiterated that it appears this was not communicated to the GN and the biologists were not able to plan for this.Tonight was the first it was brought up about the desire for a public meeting.

- End of meeting

C: Kugaaruk

October 22, 2020

Start: 18:50

End: 21:20

<u>Participants:</u>

Athol Ihakkaq
Jesse Apsaktaun
Mariano Uqqaraluk
Columban Pujuarajok
Mark Kutsiutikku
James Nasalik
Ema Qaqqutaq from KRWB
J. Ware – GN-DOE
M. Dyck – GN-DOE

Introduction and Objectives:

- mandate is to provide this information to co-management partners. Ideally, I would have liked to have both the science and IQ studies come out at the same time---unfortunately Covid impacted the IQ study researcher's ability to finalize the study at the same time.

Background:

- background of studies from 1970s to 2000. Heard from communities from last 3-4 days is that there have been a lot of changes in the environment and sea ice. Our obligation is to get new information to not just the GN, but also hunters, HTOs, RWOs, and to NWMB because they need the information to set the TAH; no questions

- The question that was important at the time—number of bears can be answered by the biopsy darting. However, with this method, we cannot answer questions about movement or industrial activity.

Community participation:

- incorporate the input from HTO/hunters to help us know where to look for bears---where were good places to search; no questions

Study Design/Methods: review; no questions

Study Design/Analysis: review; no questions

Results: shift in distribution? Why are there changes in the bear observations?

- Ema: that area in committee Bay was usually open water in 1998-2000

- Athol: Yeah, that is often open water near the floe edge

Results: body condition? Any thoughts or similar observations of you guys as to bear fatness? Are you seeing any skinny bears? No real comments---board seemed to agree

Results: reproduction – key measures we look at to help compare from old study to new study or to other populations

- **Question Jesse**: have the number of Coys per adult female gone down because there are more females in the population now than 1998-2000?

- **Answer Markus**: can't remember off the top of my head---will have to consult the report, but my memory is that the number of males has gone down slightly---likely because of the 2:1 harvest ratio. Females may have increased slightly.

- **Answer Jasmine** – cited report for female proportion – 57% in 98-00 and 61% in 15-17. That is in line with the 2:1 male to female sex ratio—that's why it's not 50:50.

Results: survival; no questions

Results: growth rate; no questions

Results: abundance; population is stable, even with changes in environmental changes. This is good news. This is a collective accomplishment among the hunters and government in managing this population.

GN Recommendation: we are not recommended a change in TAH.

- **Question Ema**: would you recommend to SARA to downlist?

- **Answer Markus**: there isn't anything to downlist because they look at polar bears as a whole. SARA and COSWIC looks at these data for the next assessment. The next assessment will be likely in 2025—I provide this information to them. Plus this information not only goes into Canadian assessment, but also internationally. I am defending the Nunavut polar bear numbers internationally. This is good information for the outside world. However, it is important to remember to that we, me and you, we cannot know for certain what the future holds---what do the environmental changes impact for bears do in 5, 10, 20 years. What do the communities want and feel? There are different communities in Nunavut that note public safety, levels of social tolerance, I hear the communities say those things. It is important for the community to come up with what you want to do with this population---having a management objective. The decision you make now, always keep in mind to keep the future in mind.

Shows video of biopsy darting

- One more thing to mention to be fair since I've mentioned to the other communities. This is about movement….I respect that communities and HTOs do not want collaring or handling. I have had, in the past, organizations have asked about impacts of development on polar bears, but I could not provide that information because we do not have it. There is no pressure from me or the GN for collaring, but it's important to think about what questions you have and the information you need---describes benefits of collaring.

- I know that we have not been able to visit communities and I regret that. You are looking at the 2 people, sometimes 1 person, and we can't be there or everywhere.

- Jasmine: also, as the future unfolds, if there are priorities from the communities, bring those forth to the RWO and NWMB priority meetings because the GN uses those to help determine how they allocate funding. We have a mandate for abundance, but for other priorities, knowing what communities wants is very helpful.

- Markus: addresses why it has taken so long for us to get here with results. DNA analysis, finding old samples, ransomware, covid

- Another thing we learned is that having long gaps of 15 years makes it very difficult to get survival. Doing one more year of marks/biopsy sampling would be helpful, maybe 5 years.

Questions:

- **Question Mariano**: did you see any bears that were wounded or sick?

- **Answer Markus**: in 3 years, I haven't seen any sick bears and no dead bears. I didn't see any dead cubs.

- Mariano: We had 4 bowhead whales die and was wondering if the bears were sick from that---not sure why the whales died.

- Jesse: going back to the topic of collars, I like the ideas of perhaps of collaring some bears because I do like seeing scientific data because it can tell a story. I'm not pushing back against IQ. But, I like to see the procedure – what are the pros and cons --- how many bears would you collar. I would want to see the positive and negative impact. Because it would be good to see where the bears are traveling. In the past 3 years, we are having bowhead whale issues since the cruise ships. Is the Northwest Passage gonna affect the bears?

- Jasmine: I feel like the IQ tells a story and the collars tell a story too –they together, tell a bigger story.

- Jesse: We need to get our residents to understand the positive and negative of bears. For example, if we have 10,000 bears and we collar 10 bears, what are the negative effects on those? I would recommend you providing a pros and cons. pamphlet

- Markus: Would it be helpful just to have a document, but that probably leads to more questions….it might be helpful to have a chat after you

- Athol: the Baffin area with the mine---they're going to put a shipping route in---that is going to affect the bears–we know that.

- Jesse: It's like we need the scientific data because we don't live out on the land like our grandparents did…I live in settlements 99% of the time. We have to educate ourselves and the future---like the shipping lanes.

- Markus: what you're exactly saying is similar to Baffin Bay and Kane Basin---communities saw climate change and wanted to know where the bears were going and what denning was doing. We worked with them and put out about 10 collars every year, a total of 30-35. And the data are huge

- Athol: the IQ and putting the collars together. I agree with the collars for the future.

- Markus: we are doing the LS starting next spring. We can maybe have communications to see what could work with the HTO. We have 3 years – maybe we could put a few collars out depending on your questions.

- Jasmine: to Jesse – maybe you could write your specific questions/concerns and that would help us design a study and collars.

- Mariano: I don't see any huge bears anymore 14-15ft bear.

- Markus: These are good observations to provide to Pam---that's the type of IQ that we need. When another study done in a few years, maybe there are different sizes and you document them.

- After board members left, GN representatives gave KRWB representative the MC presentation so that he also was informed about the study results.

D: Naujaat

October 26, 2020

Start: 18:10

End: 21:50

Participants:

NTI: Paul Irngaut
QWB Chairperson: James Qillaq
NWMB: Denis Ndeloh, KJ England, Steve Mapsalak
GN: Markus Dyck, Jasmine Ware, Jon Neely, Peterloosie Papatsie
HTO: Hugh Haqpi – acting manager
Paul Angotituar
David Ammaaq
John Ell Tinashlu
Peter Manniq
Dino Mablik
Mark Tigumiar – vice chairman

- Meeting started with introductions around the room

- Presentation
- GN representatives stressed that the IQ study is ongoing and has been delayed due to COVID because its results depend on ability of researcher, Pam Wong, being able to verify interviews and speak with interviewees. Ultimately, together the science and IQ will all go together to the NWMB for decisions for a bigger picture. Looking for a good discussion among everyone – we want to get feedback on what we present this evening.

- Paul Irngaut: Informing the group that NTI wasn't on the first leg of the consultations and explaining that he and James (QWB) are here as observers.

- Markus: asks board if they want to do background on GB and they agreed.
- **Background slide review:** no questions
- **Goals of Study/need for new info:** no questions

- **Question Hugh:** the boundary that you first showed is the boundary? What are the new boundaries that you show?

- **Answer Markus:** *reversed to previous slide showing 1970s boundary* Biologists back in the 1970s/Govt of NWT/local communities outlined as where there are a lot of bears and because they didn't know much about numbers of bears for any areas, they decided to survey this area. So, this circle (*shows red circle) was in a way arbitrary.

- Paul I.: can I explain a little bit? Explains the role of the Range States, Polar Bear committees like the PBAC/PBTC.

- Markus: Further explains the management unit boundaries---The brown lines show boundaries based on movements of female bears with collars that were put on bears in the 1980s-1990s.

- **Question David**: Question about the boundaries -- that NWT boundary (*red circle) that is pretty big --- do the tags depend on the boundaries?

- **Answer Markus:** For each of the areas, we know how many bears there are in each of these areas and the NWMB has set a TAH based on that. Based on how many bears there are in total and based on what the management objective is --- some communities want a population to stay stable, so you can't harvest as many if you want to keep population stable. From the total # that is determined the TAH. For Gulf of Boothia, NWMB decided 74 total allowable harvest and then the RWO decides how the tags get distributed.

- Denis: I think what he was asking: Is there a relationship to the size of the management unit to the number of tags?

- **Answer Jasmine:** No, the size doesn't tell you how many bears there are. Some areas are quite big but don't have many bears. MC/GB for example. Tags are based only on how many bears there are in an area.

- **Study method choices slides:** Discusses how alternative options to traditional capture mark recapture were presented during initial consultations in 2013 (aerial survey, DNA biopsy). Reviews biopsy darting and how it works. Shows biopsy dart, passes it around. Explains how the method differs from traditional mark recapture and why we don't get as much data.

- **Question Hugh:** does the genetic DNA biopsy indicate age and health of the bear? Has there been any disease since the start of the mine?

- **Answer Markus:** Lots of good questions in there. We cannot get the exact age because we do not have a tooth. We cannot see anything for contaminants–our sample is too small. And no disease can be seen other than a big injury on the bear because we are not handling or touching the bear. The hunters can report back if they notice something weird or sick with the bears, disease – fills in gaps that we have with the science study.

- **Community participation slides:** no questions

- **Study design slides:** no question

- **Question:** From the 70s study to now --- how do you see the health from then to now?

- **Answer Markus:** good question---we are going to get to that in a minute---not really from the 70s cause we don't have tissue and samples from back then, but we were able to compare to the 1998-2000 study and we will get to that shortly.

- **Results:**
- **Question Hugh:** was there any changes in the biopsy based on climate change? Were bears getting fat, getting skinny, any disease

- **Answer Markus** – We can't see disease from this type of study. We rely on hunters to bring in anything that looks diseased. Body condition we do know and we will talk about that in a couple of slides.

- **Review of shifts in distribution slide:** Based on where we observed and sampled bears in 2015-17 compared to 1998/2000, appears to be a distributional change---maybe because of sea ice and seals? Bears have likely adjusted to these changes

- **Comment:** maybe more narwhal carcasses?

- **Peterloosie:** Those 2 high concentration areas in 2015-2017 – are two polynyas. Usually a polynya with open water around these areas that were empty of bear observations in 1998-2000.

- **Question Markus:** Do hunters notice changes in ice? How does ice look compared to 20 years ago?
- David: The ice is very thin and more drifting snow---it's not compacting and not making ice. Not forming properly.

- Markus: how is that for seals?

- John: When it is very thick, it is good for the seals. When it is very thin, it is not good for seals.

- **Results: Body condition**

- Comment: Bears back then were skinnier so this fits with what you're showing us.

- **Question Hugh:** Have you noticed difference in temperature and its effects on body condition? As in warmer temperatures make bears skinnier and the cooler temps get them fatter and ready for hibernation?

- **Answer Jasmine:** we haven't looked at that, but we could easily see what the average temps were during the field work for each of the study years and compare.

- Peterloosie: I think that the seal pups are getting bigger – saw one that was 3 ft long –huge. Maybe they are bigger and feeding bears.

- Jasmine: Describes thinning ice and changing productivity of ecosystems with decreasing ice thickness and more dynamic ice being potentially helpful for bears because the ecosystem is boosted in productivity (algae, fish, seals, bears). Theory because we do not have data on seals or fish for these areas. Markus is working with DFO to try and get information for seals.

- Markus: describes efforts to get seal info with DFO. The Lancaster Sound is where we are going to try to get seal info as a start.

- Hugh: I'm from Baker Lake where there are no polar bears. Back in the 60s and 70s, there were 4 or 5 bears caught super inland --- the bears were migrating to the west. Cause looking at LS and GB and comparing the distance from Gjoa Haven and Hudson Bay is about the same distance.

- Markus: There are some bears that move a long distance. Gives a couple of examples.

- **Question John:** I have a question about scientists---do you keep in contact with other provinces, territories? Or do you not talk to the other scientists?
- **Answer Markus:** There are 8 populations in Nunavut that are shared between jurisdictions/provinces/territories that I work with when there are studies – mentioned Baffin Bay and James Qillaq working with Greenland. Also Western Hudson with Manitoba. All the jurisdictions meet once per year, more frequently on the phone, so definitely in contact with other scientists and jurisdictions.

- I also present information gathered in Nunavut to international community and defend the Nunavut harvesters and Nunavummiut. We exchange this information with different countries.

- Paul I.: talked in Inuktitut for a while and explained he reviewed the PBTC and polar bear advisory committee and status table. That you guys meet once per year and review the polar bear populations.

- John: conversation in Inuktitut with Paul I.

- Paul I: John was asking about the ECCC ongoing mark-recapture study in Western Hudson and the effects of being handled/lack of hearing. At the Advisory Meeting where ECCC is a member, we voiced our concerns with handling bears, but also mentioned that that handling occurs in Manitoba which Nunavut has no control or jurisdiction over.

- Inuit have been opposed to handling of wildlife of any kind, especially polar bears. We have pushed for biopsy darting. We have made this known to our counterparts in Manitoba and ECCC. They know our concerns and to date we haven't seen any changes on their part.

- Peterloosie: I think John that was saying is that the bears are going partly deaf after so many helicopters getting close and then landing next to them. Then the partially deaf bears are moving north into Nunavut and causing issues.

- Steven: you came here to do a presentation to do Gulf of Boothia; I think that maybe we stick on topic.

- Markus: We are happy to answer to any questions and it's not like we are here that often so we are more than happy to entertain any questions on any topics for as long as you all want.

- Break --- 10 minutes ---
- **Reproduction slides:** coys/yrlgs – offspring per ad. Female

- **Question Hugh** - Are there more cubs with females in old study?
- **Answer Jasmine** – there are a few that have 2 cubs more than just 1; some hunters see 3 coys, none were seen during the study period, but maybe recently this is happening more?

- **Question Peterloosie** – reproduction is low with 1.6?

- **Answer Markus:** I know it looks low, but in context, it is not a low number. That is actually very good reproduction numbers in Gulf of Boothia *explains values that would be concerning. The observation you see represent localized observations; our number is averaged across the entire study area at the same time so *all the moms with single cubs and twins get counted and averaged.

- **Question Hugh** – pb numbers are low with low seal numbers?

- **Answer Jasmine –** we do not have seal numbers in Nunavut, likely it is the case when seals are poor, bears likely do not reproduce.
- **Survival slides:** -- no questions
- **Pop growth slide** – no questions
- **Abundance slide** – no questions; describe the range of the number and why there is a range – uncertainty in science because no one thing can know all. It reflects that there are likely biases and errors in places, that is why the result produces a range of numbers rather than an exact number.

- **Further questions slide:** other questions that the hunters/communities have regarding boundaries, denning, development (mines, shipping) --- if these become concerns, methods such as collaring would likely have to employed. IQ and DNA biopsy can inform parts of the puzzle, but each method provides its own information.

- Markus: further questions – do you see bears staying the same?

- Comment: feels like they are increasing around.

- Markus: That’s definitely true – between 1850-1935 that’s when a lot of whalers came to Canada/Nunavut and bears were shot. Not many bears in the 1950s and 1960s –but definitely more bears now.

- John: even berry picking, we have to bring our gun and be a safety guide

- Paul: Can’t even go camping anymore.

- Markus: that’s good information – need to talk to Pam and see if that’s helpful to include and help us to understand the bigger picture – have bear distribution changed? ---could ask that for Pam to include

- Hugh: population going up, bears come more to community. IQ says there is bear movement and that is true – larger bears move farther out. Now and then, there is sometimes a 12 footer but average is 8 ft.

- Markus: do you see you big bears?

- Peterloosie: They are talking more Foxe Basin, not so much Gulf of Boothia for those big bears

- **GN Recommendation TAH slide**: with the info the government collected, and with the objective to maintain the subpopulation, we are not recommending a change in TAH.

- **Discussion with group about TAH Increase and Tag Allocations – originated organically from group and created lots of discussion with NTI, NWMB, QWB, and GN offering information on processes, options, and clarifications for how TAH increases or reallocation among communities may occur.**

- **Question:** about harvesting, can we have more than 5 tags?

- **Answer Markus:** There are a few options. The government is not recommending a change. However, depending what is presented to the NWMB, there are options for the Regional Wildlife Organizations and communities to talk ---have to be on the same page – the communities have to have the same objective –keep pop same, higher, lower. Then, the RWO, supported by HTO's needs, makes their submission to NWMB – may or may not be the same as the Governments.

- We have to understand that this is not black and white, we know that the population has stayed the same, but I don't have a crystal ball to know what the future holds. When the decision makers (RWO, NWMB, etc) increase the TAH, there is a risk that the system that you could screw up the system --- it is a question of how much risk are you willing to take. Are you willing to take a risk that is very high --- say TAH of 90-100? – but that is very very risky. We want to make sure we provide for future generations – that is our mandate in the Government. But, it is not for us to say what the management objective for a population should be. This is a decision for the communities to think about. It is not an easy decision.

- Another option is to bring forth a request for reallocation to the Regional Wildlife Organizations– based on concern or need. The RWOs can redistribute the tags at any time—does not need to be a new study or anything like that.

- Anything that is not clear, contact us, we give you information. Our door is open.

- Hugh: Looking at TAH by Minister, maybe redistribute the tags ---like Coral Harbour. Difficult to talk to Arviat, Coral Harbour

- Markus: You can only discuss reallocation of tags with the communities that harvest from the same subpopulation. So Gulf of Boothia communities. And Foxe Basin communities (Coral, Cape, etc)

- Comments: Naujaat suffering defense kills and impacts on their quota from hunters coming from Rankin and Arviat.

- Markus: we have to take a look at that and see. But harvests come off the hunter’s home community – part of the Polar Bear Management Plan. MOUs are no longer in force

- *surprise comments from group indicating they are not aware of the Polar Bear Management Plan and have not seen it.

- Markus: *Explains the process the Polar Bear Management Plan went through before being ratified by the NWMB and Minister* --- The Polar Bear Management Plan was accepted after going through a multi-year process in which all HTOs across the territory were consulted. *NTI nods agreement* RWOs were consulted and part of it too. All partners were involved and – drafts sent back and forth and back and forth. Public hearing in fall 2018 and all HTOs invited.

- Denis: wanted to provide clarification for what Markus is talking about for the Polar Bear Management Plan – the wording about hunter’s home community is part of an appendix that is approved on an interim basis right now.

- KJ: it is on the NWMB website.

- **Video of darting:** clapping from John – *not sure if sarcasm or true support of method/video*

- **Question Peterloosie:** what do you think of the 1:1 harvest ratio? I think that it will increase polar bear populations in the future.

- **Answer Markus:** This is something the communities wanted, maybe not every community, but the majority. Also, in the Polar Bear Management Plan hearings. There is a concern because the TAH was not adjusted when Nunavut went to 1:1. The TAHs were set to protect females and maximize sustainable harvest. But, when 1:1 went into effect, there is a chance that more females would be harvested and could be riskier. If there is a concern, the GN will bring those concerns to the NWMB. Just because it’s 1:1 doesn’t mean it has to stay that way if there is a conservation concern with consultation with community.

- Hugh: there was a concern we would like to know the male/female ratio, we want to have balance and not drive the population down and what happens with climate change in the future is not really known.

- Markus: When there are concerns, hunters raise the flag – like MC not being able to find males – that was a trigger to lower harvest in MC and to do study. We rely on hunters to provide information because it's not possible to do studies/surveys frequently – costly.

- **Question Paul I.:** Asking how much harvesting done from here.

- John: Yes 5

- **Question:** That's why I ask if we can get more than 5. More people are hunting up there. Would like more tags. And more people go camping to hunt in March. – mostly people go to the island in Committee Bay (Peterloosie – about half the hunters go to the big island in Committee Bay).
- Markus: You don't have to wait for a new study, you can raise this with the NWMB with information or bring up with RWO to reallocate.

- John/Paul: conversation in Inuktitut -- summarizes that HTOs can allocate half a tag for a cub – request has to come from HTO, then approved by someone, Superintendent maybe. Also, they have made requests to increase TAH to the KWB, but haven't heard anything. We have a committee, under NTI, Nunavut Inuit Wildlife Secretariat, the chairs sit on the committee and we can bring it up at the next meeting.

- James Qillaq – adds comments in Inuktitut

- Comments – Rob Harmer explained procedure in spring and we are just starting to put it on paper and we can't just have ask – we have to go through process.

- Paul I.: Six communities harvest from GB so it seems that the allocation isn't exactly fair. But if want an increase in TAH, will have to bring to RWO which brings it to NWMB. If you want a re-distribution, then RWO has to do that – KWB, QWB, KRWB – they all are responsible for allocating GB.

- Steve M.: I used to be the Chair for the HTO when the MOU, there was a decrease in the TAH, Mitch Taylor was the pb biologist. There was a quota of 3 for GB for Naujaat. When the quota went to 74, Naujaat went to 5. The way the tags are allocated is done by the Regional Wildlife Organizations – it's up to them. But they have to follow the TAH. *note – not clear what this reduction is referring to. MD is not aware that there was TAH reduction for GB while Mitch Taylor was working.

- **Question:** Do you know when this will be going to the NWMB?

- **Answer Markus:** We have to finish consultations first and we maybe are done by Wednesday, and we could get back to the office and be told to get something ready for the NWMB. I don't know though.

- Jasmine: And just to reiterate, even if nothing ever goes to the NWMB and this study never happened, the concerns and requests for redistribution of tags can go to the Regional Wildlife Organizations at any time. Technically, they can reallocate each year the tags. They usually don't but it is within their rights/responsibilities.

- Steve/John Ell/James: conversation in Inuktitut

- Denis: assuming the request comes from the GN to the NWMB at some point, what is going to happen very likely, because it is 3 regions and NWMB cannot set a TAH Nunavut-wide --- the Board will determine what the TAH is for Gulf of Boothia. The NWMB will then send a letter to the 3 RWOs and ask to know how the RWOs are going to share it. The RWOs will meet and decide and then provide that info to the NWMB and this will be sent to the Minister. This is also when the communities can have their voice heard.

- Paul I.: that is why I mentioned the committee at NTI that we will bring forth this issue. If communities want to increase the TAH within the already set TAH, then that is the RWO jurisdiction.

- John Ell: conversation in Inuktitut – about Foxe Basin – *not sure what was said. Left abruptly*

- Paul I.: I was explaining that communities get together to discuss and agree on what they want—if they bring that forth, it is much more powerful than a single request.

- KJ: because there are so many communities and regions are covered, the easiest option would be to request for a transfer of credits for a short term increase in quota. Another option would be going to the RWO, to advocate with the other RWOs, for a change in allocation. Thirdly, work with all the RWOs and advocate for a change in TAH.

- **Question:** when do you plan to study Gulf of Boothia again?

- **Answer Markus:** With the previous study plans, studies were done every 10-15 years. With this analysis, we realized that this long timeframe is too long. Makes the analysis really difficult to have that long period with nothing. We ideally would like to come back in 4 or 5 years after study completion to sample bears in the entire area, but only for a single year. This would put more ‘marks’ as we call them into the population and give us better understanding of survival, reproduction. Four to five years after the single year sampling effort, we’d do another full study—where we survey the entire area 3-4 years in a row.   But that depends on what information is coming in --- from communities, or the environment. NWMB sets regional priority and makes list --- get what you think is important on the priority list. Helps the GN allocate funding and know what is pressing priorities.

- **Question Hugh:** would 4 or 5 years be enough for you?

- **Answer Markus:** we would do a single year, cover the whole area between April/June. We’d do this in 4-5 years. In 5 years, we need to put more marks out because the bears marked in 2015-2017 are dying.

- We cannot get a full population abundance by putting 1 year of marks out. There is maybe a chance if we do genetic samples in 1 year, there is maybe a way to update the abundance – but there is no guarantee because it will be the first time. We are learning as we go.

- Jasmine: noted the increase in time for DNA biopsy analysis. DNA analysis takes significantly longer than traditional mark-recapture – by at least 9-10 months.

- Markus: we are open to communication and work for you.

- Jon Neely: I didn’t realize that defense kills from residents from other communities might be counted on your quota so we can look at that. We also have money in the deterrence budget – HTOs can apply for up to 10k for bear deterrence equipment – bear bins, fence. If a bear does damage your cabin, we have another program that can pay up to a few k for repairs and such. Talk to Peterloosie a bit tomorrow.

- Peterlooise: We applied for scare cartridges in early June – but we haven’t heard.

- Jon: We can look into that – I wasn’t aware of this application. I do apologize – I did not see that program application this year. That is something we will fix on our side. We will make sure that program works better for you.

- KJ: thanked the biologists and their work, difficult to get around – only 2 of them. Thanks to the HTO for community sampling program.

End of meeting

E: Sanirajak

October 27, 2020

Start: 19:15

End: 21:15

Participants:

NTI: Paul Irngaut
QWB Chairperson: James Qillaq
NWMB: Denis Ndeloh, KJ England
GN: Markus Dyck, Jasmine Ware, Jon Neely, B. Grosset
HTO: Lizzie Phillip-Qanatsiaq – secretary manager
Jopie Kaernerk – Chairperson
Danny Arvaluk
Jaypeetee Audlakiak
Sam Arnardjuak
Zillah Piallaq
Cain Pikuyak
George Innuksuk

Introductions around the room

Question to the Board re: background – Markus asks Board how much detail on background

Question: how much time with all the background?

Markus—material about 2-2.5 hrs but depends on interaction and how many questions the members have. I think it's beneficial to have the background so we can go over it.

Objectives of Presentation: reminds Members that the IQ study is ongoing for Gulf of Boothia. We are hoping that the information you have is provided to Pamela. Ideally, the science and IQ would be together, but COVID has prevented the IQ and the fact that Sanirajak has not had a Manager for quite some time.

Background review slides: no questions

Goals of study slides: Refreshed commitment of MOUs that new research had to be conducted for GB in 2015. Review goals including how sea ice changes incorporated – see how bears are doing as sea ice changes. No questions.

Study method choices slides: Refresh that DNA biopsy method was supported by communities back in 2013. The DNA biopsy method gives us information about the abundance. Reminded about drawbacks of biopsy darting. No questions.

Community participation slides: review, no questions

Study design/analysis slides: review, remind that hunters bring muscle and fat that can be used to address contaminants questions; no questions

Results slides…map with dots, flight lines….map comparison old vs new distribution – no questions

Question Jasmine – are you seeing bears evenly distributed like in the 2015-17 study? Didn't catch answer…something with Naujaat

Who was sampled slide – tells us some bears are moving between areas – no questions

Jasmine question -- Body condition slides – have you noticed less skinny bears than 20 years ago?

Comment: Maybe more carcasses on shore than other areas?

Hunters are only over in GB in spring only – bears are skinnier due to mating, Sanirajak only goes there in spring

Some people do not hunt bears anymore because the hides are not worth a lot of money

Reproduction slides – review; no questions

Survival slides, review;– no questions

Growth rates slides – no question

Abundance slide – interpretation slide – no questions

Questions slide – questions: walrus on top of ice in September – did bears get counted in spring down there?

Answer Jasmine – we sample them when there is ice in spring, when there is open water we can't sample really – too dangerous for flying

Question was more about FB – when we do FB we actually do it in fall, Aug and Sep.

Review of slides and questions…are there too many bears in GB, too few?

Comment: not too many bears hunted in GB, not too many sport hunts; COVID-19 likely not much sport hunts

Question – seal populations is having an impact on pb population? Under water sonar…might have an impact on bear populations

Answer Markus – explained NWMB priority list, work with RWO to have seal abundance and impacts on priority list; I can also ask DFO biologists to see if there is a desire for research

TAH slide – question-in the winter when the quota is not completed; traditional hunting and bears taste better in summer – can we hunt in summer;

Jasmine Answer – when you hunt is an HTO decision; The GN does not care when hunts occur; season is July 1 – June 30…all year.

Question: when there are more bears in summer, and there are sport hunters, how can we harvest more?

Answer JNeely – we normally distribute tags in fall, but tags can be sent sooner in the season to assist with sport hunts if you want to have summer hunts

Movie – darting…..

Question: When you are doing your research – have you seen the bigger bears? 12-14 feet or more?

Question Markus - In FB? Or GB?

Question: they move in March, Sanirajak hunts in spring in GB…where are they moving to?

We asked hunters to show but they could not tell because of the ice conditions, changing too much

Question: is that the same in Hudson Bay bears from Churchill?…assumed the question relates to abundance(?).

Markus Answer – there are different numbers of bears in the populations, and not every area that is large does not necessarily have a large number of bears.

No more questions - End of meeting

E: Igloolik

October 28, 2020

Start: 18:40

End: 21:42

<u>Participants:</u>

NTI: Paul Irngaut
QWB Chairperson: James Qillaq
NWMB: Denis Ndeloh, KJ England
GN: Markus Dyck, Jasmine Ware, Jon Neely
HTO: Jacob Malliki
David Irngaut – Chairperson
Gideon Taqaugak
Daniel Akittirq
Michelline Ammaaq
Joannie Alaralak
Salomon Mikki
Natalino Piugattuk
Loyd Idlout
Janet Airut - translator

Introductions around the room

Background slides: review; no questions

Goals of Study: review and reasoning for new research study – MOUs obligations for updated information and Total Allowable Harvest information to decision-makers – RWO/NWMB; no questions

Study method choices: review when initial consultations occurred in 2013. Balance between methods and the trade-offs between different method choices. Review that all HTOs supported the less invasive method. Describe DNA biopsy and passed around dart. Explained how skin sample and genetics works to 'mark' or identify a bear so that we can track it through time. No questions.

Community participation slides: Review; no questions

Study design/goals slides: review; no questions

Results: maps – questions – shift in distribution?

Salomon: answer – count up to 47 family groups in summer – count bears in summer would be better;

Jasmine – is it new to see more than 2 cubs; usually 2 offspring, but recently seen 3 cubs, a bit rare but seen

Question Salomon – Could you monitor in summer time? Is that possible?

Answer Markus: The area you pointed on the map is Foxe Basin and we do our monitoring in the summer there. But for GB the ice doesn't go away completely so we do it in the spring when most bears will be on the ice hunting and breeding.

Natalino – ice comes from aqqu, ice transports animals, no more ice up there and around Moag Bay there are polar bear tracks, some come up to community (this past summer); not so much ice through Hecla and Fury strait

Salomon – are bears afraid of ships? Is it because there was a ship? Ship in Hecla Strait, ice breaker…..this summer there were lots of bears near the cabins

Comment: this summer saw lots of bears in that area , more than usual…during September

Question Jasmine – do hunters go in springtime to GB or mostly summer? Do hunters see GB much in the spring?…..

Michelline – recently less ice in that area, lots of tracks;

Paul I….shifting ice is likely;

Jasmine…if more ice is shifting, ice breakers are coming through, maybe this is a time to find out how bears are moving, maybe if it's important to the community?

Gideon – if there is less ice, less polar bears, but we do not see a negative effect yet

Salomon – bears are usually where there is food; ships were dumping in that area and the seal moved; the seals went further up, maybe bears are moving up there; same in Lancaster sound across Arctic Bay

Natalino – if area is researched the funding is always a problem; excuse is always there is no funding available……

Markus/Jasmine – nod in agreement that funding is always a challenge for big projects

Question Salomon – why are you not searching up there – points to BB and KB…bears are likely moving up there and are coming down into our areas?

Answer Markus – we did sampling and research in Baffin and KB, and we had collars, but we are doing LS in 2021 for several years; maybe some bears move between MC/GB and we pick them up –

Jasmine – we are doing LS work in spring—same as MC and GB so that also might help to find out how/where they move/are at that time of year. Sampling at the same time of year gives us information that is more comparable compared to spring vs. fall sampling.

Question: why does our quota never get an increase when we feel bears are increasing? *Interpreter struggling to translate conversation – following meeting, Inuktitut-fluent GN staff member indicated that the conversation also included that Igloolik area igunaq caches were being raided by bears in FB and that's one of the reasons the HTO wants to harvest more bears in the FB area.

Answer Jasmine: gave Baffin Bay example and how process went for increase there.

Answer Markus: Describes RWO allocation responsibility and NWMB responsibility of increasing TAH. The reason there has not been an increase for GB is that there has not been new scientific information since 1998-2000.

Paul – you can approach NWMB with requests, this information goes to the govt, you have to clarify why you want quota increased; because of the studies and the results they give to NWMB; there are 3 RWOs for GB; the quota is 74 for all the communities; for FB you would need to talk to that RWO and communities.

Gideon – there are NWMB reps here; concerned about seals, there are no caribou, they would deny us quota increase for bears because they've done it before.

Natalino – took sport hunter to hunt bear, caught collared when I was 7 years old; collar came off and they lost it; head was "separated from neck"??....*maybe no fur on neck?*...a bear was caught and hide was no good and he is asking for replacement of hide from GN

Question Daniel – in FB they wanted a cub, or a family group?

Answer Paul I…it comes out of the quota,

Requested a mother and a cub last year but we did not hear about it…anyone catches a cub it counts 0.5 of a tag; *HTO comments and discussion about what 'half a tag' means. In order to stay on topic of presentation, GN indicated that these questions they could answer at an HTO meeting since they live in Igloolik and would be happy to answer harvest-related questions during a regular meeting*

James…to NWMB send your request about cubs….to them;

Results slide – describe how many individual bears and recaptures there were for GB

Question Jacob - Where is MC?

Answer Markus – explained where it is on a map

Results body condition –

Question Jasmine: Why are bears in better condition?

David: When Paul was kid almost no bears around; whenever a bear came near community, it made the news; because if there are more bears, they get skinnier – not enough food and they fight; haven't seen skinnier ones; I think and what I see is we used to wait until quota is increased, there are less bears and they are not attacking each other; the numbers will decline; not so much on the ice, more time on land; they tend to be fatter now; when people went caribou hunting hunters saw no caribou but polar bear tracks; they sometimes tend to stay in one place-someone cried about what is going to happen about to polar bears, it was a biologist, GB area always had polar bears – there are hardly any bears because they are on the land – we think if funding is available they should research sooner to get increase in quota; when they do research bears are not scared of machinery and people; the bears are not scared of people anymore; some hunters are aware of changes on bears; I would like to see more IQ being used;

Salomon – GB is being researched, I have been to Churchill and saw somebody attacked from bear; bears come into the community, up to 200 bears *unclear the time frame that the 200 observations came from*,

Natalino – went over quota, we were not penalized, we are grateful and there are lots of bears around

Paul I….talked about that the MOU is replaced by new plan; quotas were increased in BB; when a female is caught the quota is decreased, now it is 1 male or 1 female for any overharvest; the federal govt is not always in agreement with increase in quota but we have the reports from the government.

Reproduction slides – no questions

Survival slides – no questions

Growth – no slides

Abundance slides – no comments

Did not go over slides with boundary issues

Recommendations – slides

Denis – explains the process of how it works with TAH decisions and the role of NWMB; different ways of decisions and what info is used for decision making; says the GN position is to keep TAH same; Denis also explain or asks what is the risk the GN is willing to take with a new TAH decision

Paul I: the last TAH was changed in 2003 – no change in TAH since then, what is it what the communities want, The GN position is only a recommendation; send a request to NWMB, no problem if you do not agree with the recommendation right now

Natalino: chose a little increase in TAH because we have to kill bears or family group for different reasons; or the yearling is left behind when she is having another cub

Daniel-the other communities have not been communicating of what they want, and we can negotiate about the 74 bears; meet with other communities to increase quota, or talk to them

Jasmine – we are taking notes, we send them around to the communities so you can see what was discussed among the communities

Paul – we visited different communities, in Naujaat they hunt in GB, but Hall Beach does not really harvest there; have not heard from other communities

Salomon-if we make a request about GB we need to ask QWB for support, and what government are they talking about? The Federal government, American government…?; would they say no about request immediately?

Paul explains process about how the RWOs need to discuss and decide how to split up the TAH and allocate among the communities. With NTI their is the NIWS that can assist; with NWMB you go take the request and then to RWO;

Film sampling

End of meeting

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Building Nunavut Together
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Bâtir le Nunavut ensemble

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Department of Environment
Avatiliqiyikkut
Ministère de l'Environnement

ASSESSMENT OF ABUNDANCE FOR THE GULF OF BOOTHIA POLAR BEAR SUBPOPULATION USING GENETIC MARK-RECAPTURE

Final Report

12 June 2020

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Citation:

Dyck, M., Regehr, E.V., and Ware, J.V. 2020. Assessment of abundance for the Gulf of Boothia polar bear subpopulation using genetic mark-recapture. Final Report, Government of Nunavut, Department of Environment, Iglulik. 75pp.

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1.A) EXECUTIVE SUMMARY – ENGLISH -

Polar bears (*Ursus maritimus*) are managed across Nunavut, Canada, under a quota system that seeks to ensure harvest is sustainable. In recent decades, climatic changes across the Arctic have altered polar bear habitat at unprecedented rates. To retain viable polar bear subpopulations as part of the ecosystem ensure continued availability of a subsistence resource for Inuit, scientific research and monitoring studies are conducted to evaluate subpopulation status and whether management objectives are being met. Here we report the results of a population study for polar bears inhabiting the Gulf of Boothia (GB) conducted 2015 – 2017. Current samples were collected using less-invasive genetic biopsy darting without immobilizing or physically handling bears. Our analyses included 2015 – 2017 biopsy sampling data, live-capture data collected under a designed study 1998 – 2000, live-capture data collected opportunistically 1976 – 1997, and harvest recovery data over the entire period 1976 – 2017. Results of live-capture dead-recovery models fitted in Program MARK suggest that a mean abundance estimate of 1525 (standard error [SE] = 294) for the period 2015 – 2017 was similar to mean abundance in 1998 – 2000 (1610 [SE = 266] in this study; 1592 [SE = 361] in Taylor et al. [2009]). Mean cub-of-the-year and yearling litter sizes for the period 2015 – 2017 were 1.61 (95% confidence interval [CI] = 1.51 – 1.70) and 1.53 (95% CI = 1.41 – 1.64), respectively, with no apparent trend compared to 1998 – 2000. The mean number of yearlings per adult female for the period 2015 – 2017 was 0.36 (95% CI = 0.26 – 0.47) which suggests that GB is currently a productive polar bear subpopulation, despite sea ice change. This is consistent with our finding that polar bear body condition (i.e., fatness) in the spring increased between the periods 1998 – 2000 and 2015 – 2017. We detected sex- and age-specific variation in total survival rate (i.e., including harvest mortality) with higher estimates for adult females (0.95; 95% CI = 0.81 – 0.99) than adult males (0.85; 95% CI = 0.74 – 0.92) for the period 2005 – 2017. A potentially related effect was detected as an increase in the proportional abundance of females from 0.57 in 1998 – 2000 to 0.61 in 2015 – 2017. The asymptotic, intrinsic population growth rate calculated using a matrix projection model with estimates of total survival was 0.06 (95% CI = -0.06 – 0.12) for the period 2005 – 2017, suggesting strong

potential for growth. However, our results for subpopulation size and trend should be interpreted with caution because our estimate of abundance reflects the "superpopulation" (e.g., it includes all bears that use the GB management area, some of which spend time in other subpopulations as well) and our estimate of population growth rate does not account for permanent emigration from the GB management area. Overall, our findings suggest that the demographic status of the GB subpopulation is currently healthy, although we recommend that lower estimates of total and un-harvested survival for male bears warrant further investigation. We hypothesize that spatial and temporal reductions in sea ice may have provided transient benefits to the GB subpopulation due to increased biological productivity. Climate change is the primary long-term threat to polar bears and the threshold beyond which the GB subpopulation could be negatively affected by continued ice loss, like some other polar bear subpopulations, is currently unknown. This study represents the second structured population assessment in 22 years for the GB subpopulation. Based on experience garnered through this study and analysis, we submit several recommendations for consideration when planning future polar bear population studies. We suggest collecting additional data at approximately the midpoint between planned subpopulation assessments. In this case, that equals approximately 5 – 7 years from the 2017 completion of field work. Additionally, while the recommendation for movement data is not new, it continues to be highly recommended for subpopulations with known exchanges of bears between areas. In the absence of satellite telemetry data on polar bear movements, conducting a meta-analysis to investigate exchange between GB and nearby subpopulations (i.e., Lancaster Sound, GB, and M'Clintock Channel) may help alleviate some of the uncertainty around individual subpopulation estimates for these areas. Finally, when time, resources, and management objectives warrant it, we recommend conducting a quantitative harvest risk assessment to inform sustainable harvest levels.

1.B) EXECUTIVE SUMMARY INUKTITUT

ᖃᐅᔨᓴᖅᓯᓂᖅ ᐅᓄᖅᓂᖕᒋᓐᓄᑦ Gulf of Boothia−ᒥ ᓇᓄᕆᔭᐅᒃᑲᓐᓂᖅᑐᓄᑦ ᐊᑐᖅᑐᖃᕐᓗᓂ ᑎᒥᖕᒋᑎᒍᑦ ᓇᓗᓇᐃᒃᑯᑦᑎᖅᓯᓂᕐᒥᒃ−ᐱᒃᑲᓐᓂᖅᓯᓂᕐᒥᒃ

ᐊᐅᓚᑦᑎᔨᓂᙶᖅᑐᑦ ᓇᐃᓈᖅᓯᒪᔪᖅ

ᓇᓄᐃᑦ (*Ursus maritimus*) ᐊᐅᓚᑦᑎᕙᐅᔪᒃᐳᑦ ᓄᓇᕘᓕᒫᒥ, ᑲᓇᑕᒥ, ᖃᔅᓯᕚᕈᓐᓇᖅᓂᖅᑐᑦ ᐊᑐᖅᑕᐅᔪᒃᑐᑎᒍᑦ ᖁᓂᖅᑐᒃᑯᑦ ᓇᓗᙱᑦᑎᐊᕈᒪᓂᖅᑐᑦ ᑕᒪᓐᓇ ᐊᖑᓂᕆᔭᐅᔪᒃᑐᖅ ᑲᔪᓲᓐᓇᕈᓐᓇᖅᒪᖔᑦ. ᐊᖅᖀᒎᓴᖅᑐᓂ ᖁᓕᓂ, ᓯᓚᐅᑉ ᐊᓯᔾᔨᕐᓂᕆᔭᕐᒋᑦ ᐅᑭᐅᖅᑕᖅᑐᓕᒻᒪᒥ ᐊᓯᔾᔨᖅᑎᑎᑦᑎᓯᒪᕗᖅ ᓇᓄᐃᑦ ᐃᓂᒋᔭᒃᑕᕐᒋᓐᓂᒃ, ᑕᒪᓐᓇᓗ ᓱᒃᑲᓕᔫᒻᒪᕆᐅᓪᓗᓂ. ᐱᓯᒪᔪᒪᓗᓂ ᑲᔪᓯᔪᓐᓇᑦᑎᐊᖅᑐᒥᒃ ᓇᓄᖅᓄᑦ ᓇᓄᖃᑎᒌᒃᑲᓐᓂᖅᑐᓄᑦ ᐃᓚᒋᔭᐅᓪᓗᑎᒃ ᓄᓇᒧᑦ ᓇᓗᙱᑦᑎᐊᕈᒪᓂᐅᕗᖅ ᑲᔪᓐᓇᖅᑐᒥᒃ ᒪᓂᒪᔪᕐᓂᕐᒋᓐᓂᒃ ᐊᑐᖅᑕᐅᔪᓐᓇᖅᓗᓂ ᐃᓄᖕᓄᑦ, ᖃᐅᔨᓴᖅᓂᖅᑐᑦ ᓇᐅᑦᑎᖅᓱᖅᓯᓂᖅᑐᓪᓗ ᐱᓕᕆᐊᖑᔪᒃᐳᑦ ᖃᐅᔨᓴᖅᓯᔪᒪᓂᖅᑐᑦ ᓇᓅᖅᑲᑎᒌᒃᑲᓐᓂᖅᑐᑦ ᖃᓄᐃᓕᖓᓂᕐᒋᓐᓂᒃ ᐊᒻᒪᓗ ᐊᐅᓚᑦᑎᓂᖅᑐᑦ ᑐᕌᓇᔭᐅᔪᑦ ᐋᐳᑎᓯᒪᔭᐅᕙᓗᐊᖅᒪᖔᑕ. ᐅᑯᓂ ᐅᓂᒃᑲᐅᓯᖅᑲᖅᐳᒍᑦ ᖃᓄᐃᓕᖓᓂᕐᒋᓐᓂᒃ ᖃᔅᓯᐅᓂᕐᒋᓐᓄᑦ ᖃᐅᔨᓴᖅᓯᓂᕐᒥᒃ ᓇᓄᖅᓄᑦ ᓄᓇᓕᖕᓄᑦ Gulf of Boothia−ᒥ ᑲᔪᓯᓚᐅᖅᐳᖅ 2015-2017-ᒥ. ᒫᓐᓇ ᖃᓴᒐᒃᓴᐃᑦ ᑲᑎᑕᐅᓚᐅᖅᐳᑦ ᐊᑐᖅᑐᖅᑲᖅᓗᓂ ᐸᓪᕙᓴᙱᓐᓂᖅᓴᒥᒃ ᑎᒥᖓᓂᑦ ᐲᖅᓯᐊᖅᔪᒃᓗᓂ ᓇᐅᒃᑲᖅᑕᐅᒻᒧᑦ ᐊᐅᓚᔪᓐᓇᐃᓕᑎᑦᑎᙱᑦᓗᑎᒃ ᑎᒥᖕᒋᑎᒍᑦᑑᓐᖓᓂᑦ ᑲᓴᓗᒃᑕᐅᙳᑦᓗᑎᒃ. ᖃᐅᔨᓴᖅᓂᕆᔭᕗᑦ ᐃᓚᖅᑲᓚᐅᖅᐳᖅ 2015-2017-ᒥ ᑎᒥᖓᓂᑦ ᖃᐅᔨᓴᒐᒃᓴᒥᒃ ᑎᑎᕋᖅᓯᒪᔪᓂᒃ, ᐆᒪᔪᒥᑦ−ᐲᖅᓯᓂᒥᒃ ᑎᑎᕋᖅᓯᒪᔪᓂᒃ ᑲᑎᑕᐅᔪᓂᒃ ᐋᖅᑭᒃᓱᖅᑕᐅᓯᒪᔪᒥ ᖃᐅᔨᓴᖅᓂᕐᒥ 1998-2000-ᒥ, ᐆᒪᔪᒥᒃ−ᐲᖅᓯᓂᕐᒥᒃ ᑎᑎᕋᖅᓯᒪᔪᓂᒃ ᑲᑎᑕᐅᓚᐅᖅᑐᓂᑦ ᐱᕕᒃᓴᖅᑲᖅᓂᖅᑐᑦ 1976−1997−ᒥ, ᐊᖑᔪᖅᑲᖅᐸᖕᓂᖕᒐᓄᑦᓗ ᐅᑎᖅᑎᑦᑎᓂᖅᑐᑦ ᑎᑎᕋᖅᓯᒪᔪᓂᒃ ᐅᕗᖕᒐᓕᒫᖅ 1976-2017-ᒧᑦ. ᖃᐅᔨᔭᐅᔪᑦ ᐆᒪᔪᒥᒃ−ᐱᓯᓂᖅᑐᑦ, ᑐᖅᑯᔪᓂᑦ−ᐱᕝᕕᖅᑲᖅᓂᖅᑐᑦ ᐊᑐᖅᑕᐅᓇᔭᖅᑐᓂᒃ ᐋᖅᑭᒃᓱᖅᑕᐅᓯᒪᔪᓂ MARK-ᒥ ᐃᒪᐃᑎᑦᑎᖅᑰᔨᕗᑦ, ᖃᔅᓯᐅᓂᕐᒋᓐᓄᑦ ᖃᔅᓯᐅᓇᓱᒋᔭᐅᔪᒥ 1525−ᓂᒃ (ᑕᒻᒪᖅᑕᐅᓗᐊᒃᐸᒃᑐᖅ [SE] = 294) 2015 − 2017−ᒧᑦ ᐊᔾᔨᖅᑲᑲᓴᓚᐅᖅᐳᖅ ᐅᓄᖅᓂᕆᔭᕐᒋᓐᓄᑦ 1998 − 2000−ᒥ (1610 [SE = 266] ᑕᕝᕙᓂ ᖃᐅᔨᓴᖅᓂᕆᔭᐅᔪᒥ; 1592 [SE = 361]ᐅᕙᓂ, Taylor et al. [2009−ᒥ]).

ᓄᓇᕗᑖᖅᑖᕆᔭᐅᑦ ᐊᕐᕌᒍᒧᑦ ᐊᕐᕌᓂᓕᓴᐃᓪᓗ ᐊᖏᑎᒋᓂᖏᑦ 2015 – 2017–ᒧᑦ 1.61–ᖑᓚᐅᖅᐳᑦ (95%–ᒥᒃ ᑕᕝᕙᒻᒪᕆᐅᓂᖏᓐᓂᒃ [CI] = 1.51 – 1.70) ᐊᒻᒪᓗ 1.53 (95% CI 1.41– 1.64), ᑭᖑᓕᕇᒃᑐᑎᒃ, ᐅᔾᔨᕐᓇᖅᑐᒥᒃ ᖃᓄᐃᓕᕚᓪᓕᐊᓂᑲᕗᓂ ᑕᑯᓪᓗᒍ 1998 – 2000. ᖃᔅᓯᐅᓂᕆᔭᖏᑦ ᐊᕐᕌᓂᓕᓴᐃᑦ ᐃᓐᓇᕐᒧᑦ ᐊᕐᓇᒧᑦ 2015 – 2017–ᒧᑦ 0.36–ᖑᓚᐅᖅᐳᖅ (95% CI = 0.26 – 0.47) ᑕᒪᓐᓇᓗ ᐃᒪᐃᑎᑦᑎᖅᑰᔾᔪᓪᓗᓂ, ᑖᓐᓇ GB ᒫᓐᓇ ᕿᑐᙱᕆᐅᕝᕕᐅᓪᓗᓂ ᓄᓈᓂᑦ, ᓯᑯᖓ ᐊᓯᔾᔨᖅᓯᒪᓕᕋᓗᐊᖅᑎᓪᓗᒍ. ᑕᒪᓐᓇ ᐊᔾᕼᖅᐳᖅ ᖃᐅᔾᔭᕐᑎᓐᓂᑦ ᓄᓇᐃᑦ ᑎᒥᖏᑕ ᖃᓄᐃᓕᖓᓂᖏᑦ (ᓲᕐᓗ, ᖁᐃᓂᓂᖏᑦ) ᐅᐱᙵᒃᑯᑦ ᐊᖏᒃᓕᒋᐊᓚᐅᖅᓯᒪᕗᖅ ᐅᑯᓇᓂ, 1998-2000–ᒥ ᐊᒻᒪᓗ 2015-2017-ᒥ. ᖃᐅᔾᓚᐅᖅᐳᒍᑦ ᑭᓲᓂᖏᓐᓂᒃ ᖃᔅᓯᓃᓗ ᐊᕐᕌᒍᖃᕐᓂᖏᓐᓂᒃ–ᐱᕚᑎᖃᓪᓗᐊᑕᖅᑐᒥᒃ ᐊᔾᔨᙳᖏᓐᓂᕐᒥᒃ ᑲᑎᕐᓗᒋᑦ ᐆᒪᔪᓐᓇᕐᓂᕆᔭᖏᓐᓂ (ᓲᕐᓗ ᐃᒪᓐᓇ, ᐃᓕᒋᔭᐅᓗᓂ ᐊᖑᔭᐅᓯᒪᔪᑦ ᑐᖁᑕᐅᔪᑦ) ᖁᑎᖕᓂᖅᓴᒥᒃ ᖃᔅᓯᐅᓇᓯᒋᓈᔪᖃᖅᑯᓂ ᐃᓐᓇᕐᓄᑦ ᐊᕐᓇᓄᑦ (0.95;95% CI=0.81-0.99) ᐃᓐᓇᕐᓂᑦ ᐊᖑᑎᓂᑦ (0.85;95% CI=0.74-0.92 ᐊᕐᕋᒍᓄᑦ 2005-2017. ᐊᒃᑐᐊᓂᖃᑐᐃᓐᓇᓇᐊᓕᖕᒥᒃ ᖃᓄᐃᓕᖓᓕᕐᓂᕐᒥᒃ ᖃᐅᔨᔭᐅᔪᖃᓚᐅᖅᐳᖅ ᐅᓄᖅᓯᒋᐊᕐᓂᐅᓪᓗᓂ ᖃᔅᓯᐅᓂᕆᔭᖏᓐᓄᑦ ᐊᕐᓇᐃᑦ 0.57–ᒥᑦ 1998–2000-ᒥ 0.61–ᒧᑦ 2015–2017–ᒥ. ᖃᔅᓯᐅᓂᖏᓐᓄᑦ ᐅᓄᖅᓯᕙᓪᓕᐊᓂᖏᑦ ᖃᔅᓯᐅᓇᓯᒋᔭᐅᓂᖏᑦ ᐊᑐᖅᑐᖅᑲᓗᓂ matrix ᖃᓅᓂᐊᕋᓯᒋᓈᓂᕐᒧᑦ ᐊᑐᖅᑕᐅᓇᔭᖅᑐᒥᒃ ᖃᔅᓯᐅᓇᓯᒋᓈᔪᖃᓗᓂ ᑲᑎᕐᓗᒋᑦ ᐆᒪᓂᓇᔭᖏᑦ 0.06-ᖑᓚᐅᖅᐳᖅ (95% CI = 0.06 - 0.12) 2005-2007–ᒧᑦ, ᐃᒪᐃᑎᑦᑎᖅᑰᔾᔪᑎᒃ ᓴᙱᔪᒥᒃ ᐊᔪᙱᓐᓂᖃᑐᐃᓐᓇᓇᐊᖃᖅᑐᑎᒃ ᐱᕈᖅᐊᓪᓕᐊᓂᕐᒥᒃ. ᑭᓯᐊᓂᓗᑦᑕᐅᖅ, ᖃᔾᔭᕗᑦ ᖃᔅᓯᐅᓂᖓᑕ ᐅᓄᖅᑎᒋᓂᖏᑦ ᖃᓄᐃᓕᕚᓪᓕᐊᓂᖏᓪᓗ ᑐᑭᖃᖅᑎᑕᐅᓕᓪᓗᐊᖅᐳᑦ ᐅᔾᔨᖅᓯᑦᑎᐊᖅᑐᖃᕐᓗᓂ ᐃᒪᐃᓐᓂᖓᓄᑦ, ᖃᔅᓯᐅᓇᓯᒋᓈᓂᕚᑦ ᐅᓄᕐᓂᖏᑦ ᐊᒃᑐᐊᓂᖃᒻᒪᑦ "ᐅᓄᕝᕙᐊᕐᓂᖏᓐᓄᑦ" (ᓲᕐᓗ ᐃᒪᓐᓇ, ᑕᒪᓐᓇ ᐃᓚᖃᖅᐳᖅ ᓄᓄᓕᒫᓂᒃ ᐊᑐᖅᐸᒃᑐᓂᒃ GB-ᒥᒃ ᐃᓂᒥᒃ ᐊᐅᓚᑦᑎᕝᕕᐅᔪᒥᒃ, ᐃᓚᖏᓪᓗ ᐊᓯᒥᓂᑦᑕᐅᖅ ᓇᓅᖃᑎᒋᔭᓃᑉᐸᒃᑐᑎᒃᑕᐅᖅ) ᖃᔅᓯᐅᓇᒋᓈᓂᖅᐳᓪᓗ ᖃᔅᓯᐅᓂᖏᑕ ᐅᓄᖅᓯᕙᓪᓕᐊᓂᓕᖓᔭᖏᓐᓄᑦ ᐃᓚᕋᙱᓚᖅ ᐊᓯᐊᓄᐊᕋᔭᕐᓂᕐᒥᒃ ᑕᐃᑲᓃᖏᓐᓇᓂᕐᓗᓂᓗ GB–ᒥᑦ ᐊᐅᓚᑦᑎᓂᕐᒧᑦ ᐃᓂᒥᑦ. ᐊᑕᖏᓐᓗᓂ, ᖃᐅᔾᔭᕗᑦ ᑕᑯᑎᑦᑎᖅᑯᔾᔪᑦ ᓇᓂᐅᓂᖏᓐᓄᑦ ᖃᓄᐃᓕᖓᓂᖏᑦ GB–ᒥ ᓄᓄᕆᔭᐅᒃᑲᓐᓂᖅᑐᑦ ᒫᓐᓇ ᖃᓄᐃᙱᑉᐳᑦ, ᐃᒪᐃᒃᑲᓗᐊᖅᑎᓪᓗᒍ, ᐃᒪᐃᓕᐅᕐᑯᔾᔭᓴᖅᑎᓪᓗᑕ ᐊᑦᑎᖕᓂᖅᓴᓂᒃ ᖃᔅᓯᐅᓇᓯᒋᓈᓗᑎᒃ ᑲᑎᕐᓗᒋᑦ ᐊᖑᔭᐅᓯᒪᙱᑦᑐᓄᓪᓗ ᐆᒪᔪᓐᓇᕐᓂᕆᔭᖏᓐᓄᑦ ᐊᖑᑎᖏᑕ ᓄᓇᐃᑦ ᓱᓕ

ᖃᐅᔨᓴᖅᑕᐅᒃᑲᓐᓂᕆᐊᖃᖅᑎᑦᑎᕗᑦ. ᐃᒪᓐᓇᐅᓇᓱᒋᓐᓈᕗᒍᑦ, ᐃᓂᒥᓂ ᓇᓃᓐᓂᖕᒋᓐᓄᓪᓗ ᒥᑭᓪᓕᕆᐊᖅᑐᖅ ᑐᕌᕐᒥ ᐱᑎᑦᑎᑐᐃᓐᓇᓇᐊᖅᑲᖅᓯᒪᕗᖅ ᓅᓐᓂᕐᒧᑦ ᐱᕚᓪᓕᕈᑕᐅᓯᒪᔪᓂᒃ GB–ᒥ ᓇᓄᓐᓴᐅᒃᑲᓐᓂᖅᑐᓄᑦ ᑕᐃᒪᐃᔾᔭᑎᖃᖅᓱᑎᒃ ᓄᓇᒥᐅᑕᐅᓂᕐᒧᑦ ᐅᓄᖅᓯᕚᓪᓕᐊᕚᖕᓂᓴᖕᒋᓐᓄᑦ. ᓯᓚᐅᑉ ᐊᓯᔾᔨᖅᐸᓪᓕᐊᓂᖓ ᐱᓪᓗᐊᑕᕗᖅ ᐊᕗᖓᑲᓪᓚᒃ ᖁᐊᖅᑳᖅᓇᖅᑎᑦᑎᓪᓗᓂ ᓇᓄᖅᓄᑦ ᐊᑐᖅᑕᐅᓕᖅᓴᖅᑐᒧᓪᓗ ᑕᒪᒃᑯᐊ GB–ᒥ ᓇᓄᓐᓴᐅᒃᑲᓐᓂᖅᑐᑦ ᐱᐅᖕᒋᑦᑐᒃᑯᑦ ᐊᒃᑐᖅᑕᐅᓇᓴᖅᓂᖕᒋᓐᓂᒃ ᑲᔪᓰᓐᓇᖅᑐᒃᑯᑦ ᑐᕌᖅ ᓄᖑᐸᓪᓕᐊᓂᖅᑭᓴᖓᓄᑦ, ᓲᕐᓗ ᐊᓯᖕᒋᓐᓄᑦ ᓇᓅᖅᑎᒌᓄᑦ, ᒫᓇᒧᑦ ᑎᑭᔅᓱᒍ ᖃᐅᔨᒪᔭᐅᙱᓚᖅ. ᑕᒪᓐᓇ ᖃᐅᔨᓴᐃᓄᕆᐊᓐᓂᖕᒋᑦᓂᓴᐅᔪᖅ ᑭᒡᒐᖅᑐᐃᕗᖅ ᐊᐃᑉᐸᖓᓂᒃ ᐋᖅᑭᒃᓱᖅᑕᐅᓯᒪᔪᓂ ᖃᔅᓯᐅᓂᖕᒋᓐᓄᑦ ᖃᐅᔨᓴᖅᓯᓂᖅ 22–ᓂ ᐊᕐᕌᒍᓂ GB-ᒥ ᓇᓄᓐᓴᐅᒃᑲᓐᓂᖅᑐᓄᑦ. ᑐᙵᕕᒋᓪᓗᒍ ᐱᓕᕆᖃᑦᑕᖅᓯᒪᓂᖅ ᐱᓴᐅᔪᖅ ᑕᕝᕘᓇ ᖃᐅᔨᓇᓱᖕᓂᒃᑯᑦ ᖃᐅᔨᓴᕐᓂᒃᑯᓪᓗ, ᑐᓂᓯᕗᒍᑦ ᖃᔅᓯᑲᓪᓚᖕᓂᒃ ᖃᓄᐃᓕᐅᕐᑯᓯᓂᕐᓂᒃ ᐃᓱᒪᒃᓴᖅᓯᐅᕈᑕᐅᓂᐊᖅᑐᓂᒃ ᐱᕚᕇᓴᖅᑐᖅᑲᓕᖅᐸᑦ ᓯᕗᓂᒃᓴᒥ ᓇᓄᕐᓂᒃ ᖃᐅᔨᓴᖅᓯᓂᖕᒋᓐᓄᑦ ᖃᐅᔨᓴᕐᓂᓴᐅᔪᓂ. ᐃᒪᓐᓇᐃᓕᐅᕐᑯᓯᓇᓴᖅᐳᒍᑦ, ᑲᑎᖅᓱᐃᔭᖅᑲᕐᓗᓂ ᑎᑎᕋᖅᓯᒪᒃᑲᓐᓂᖅᑐᓂᒃ ᕿᑎᐸᓗᐊᓂ ᐱᕚᕇᓴᖅᑕᐅᓯᒪᔪᑦ ᖃᔅᓯᐅᒃᑲᓐᓂᕐᓂᖕᒋᓐᓄᑦ ᖃᐅᔨᓴᕐᓂᕐᓂ. ᑕᐃᒪᐃᓐᓂᖓᓄᓪᓗ, ᑕᒪᓐᓇ ᓇᓕᒧᕆᓴᕐᑲᖅᐳᖅ 5–7–ᐸᓗᖕᓂᒃ ᐊᕐᕌᒍᓂᒃ 2017–ᒥ ᐱᓴᓈᖅᑕᐅᓚᐅᖅᑐᒥ ᓯᓚᒥ ᐱᓕᕆᓂᕆᓴᐅᔪᒥ. ᐊᒻᒪᓗᒃᑲᓐᓂᖅᑕᐅᖅ, ᑕᒪᓐᓇ ᖃᓄᐃᓕᐅᓕᕐᑯᓯᓂᖅ ᓄᒃᑕᖅᐸᖕᓂᖕᒋᓐᓄᑦ ᑎᑎᕋᖅᓯᒪᔪᑦ ᓄᑖᖑᙱᑎᓪᓗᒍ, ᐊᑐᕐᑯᓴᐅᓯᒪᑦᑎᐊᖅᓯᒪᕗᖅ ᓇᓅᖅᑎᒌᒃᑲᓐᓂᖅᑐᓄᑦ ᖃᐅᔨᒪᔭᐅᔪᑎᒍᑦ ᐃᓂᒥ ᐊᒥᖅᑲᑲᑎᖅᑲᖅᐸᖕᓂᖕᒋᓐᓂᒃ ᓇᓄᐃᑦ ᑕᒃᑯᓇᓂ ᐃᓂᓂ. ᐱᑕᖅᑲᙱᓐᓂᖓᓄᑦ ᖃᖓᑦᑕᖅᑎᑕᐅᓯᒪᔪᑎᒍᑦ ᑎᑎᕋᖅᑕᐅᓯᒪᔪᓂᒃ ᓇᓄᐃᑦ ᓄᒃᑕᕐᓂᕙᒃᑕᖕᒋᓐᓄᑦ, ᑲᔪᓯᑎᑦᑎᓂᖅ ᖃᐅᔨᓴᖅᓯᓂᕐᒥᒃ ᖃᐅᔨᓴᕈᒪᓂᕐᒧᑦ ᐊᒥᖅᑳᖅᑲᑎᑮᒃᐸᖕᓂᓴᖕᒋᓐᓄᑦ GB–ᒥ ᖃᓂᒋᔭᖓᓂᓗ ᓇᓄᓐᓴᐅᒃᑲᓐᓂᖅᑐᓄᑦ (ᓲᕐᓗ ᑕᓪᓗᕈᑎᐅᑉ ᐃᒪᖓ, GB, ᐊᒻᒪᓗ M'Clintock Channel) ᐃᑲᔪᑐᐃᓐᓇᓇᐊᖅᑲᖅᐳᑦ ᒥᑭᓪᓕᕆᐊᖅᑎᑦᑎᓗᓂ ᐃᓚᖓᓂᒃ ᓇᓗᓇᕈᔪᒃᐸᒃᑐᒥᒃ ᐃᓛᒃᑰᖅᑐᓄᑦ ᓇᓄᓐᓴᐅᒃᑲᓐᓂᖅᑐᓄᑦ ᖃᔅᓯᐅᓇᓱᒋᓐᓈᓂᖅᓂᒃ ᑕᒪᒃᑯᓄᖓ ᐃᓂᓄᑦ. ᑭᖑᓪᓕᖅᐹᒥᒃ, ᐱᕕᒃᓴᖅ, ᐊᑐᖅᑕᐅᔪᓐᓇᖅᑐᑦ, ᐊᐅᓚᑦᓂᕐᒧᓪᓗ ᑐᕌᓇᓴᐅᔪᑦ ᑕᐃᒪᐃᑦᑐᓐᓇᖅᑎᑦᑎᒃᐸᑕ, ᐃᒪᓐᓇᐅᖅᑯᓯᓇᓴᖅᐳᒍᑦ, ᑲᔪᓯᑎᑦᑎᔪᖅᑲᖅᖅᓗᓂ ᖃᐅᔨᓴᖅᓯᓂᕐᒧᑦ ᐊᖑᓗᓂ ᖁᐊᖅᑳᖅᓇᑐᐃᓐᓇᓇᐊᓕᖕᒧᑦ ᖃᐅᔨᓴᖅᓯᓂᕐᒥᒃ ᑐᓴᐅᒪᑎᑦᑎᔪᒪᓂᕐᒧᑦ ᑲᔪᓰᓐᓇᕈᓐᓇᖅᑐᓄᑦ ᐊᖑᓂᕐᒧᑦ ᖃᔅᓯᕌᓐᓇᕐᓂᓴᐅᔪᓄᑦ.

1.C) EXECUTIVE SUMMARY INNUINAQTUN

Naunaiyaqni Amigaitpiaqni tapkuat Tariunga Boothia Nannut amigaitni Ilangi Atuqtauyut Aqnallut Anguhallut Titiqni-Angutqiktauyut

Aulapkaiyini Naittuq

Nannut (*Ursus maritimus*) aulatauyut humiliqak Nunavut, Kanata, atuqhugit haviktakhat havagutai pinahuat atuqpiaqni angutauyut ihuaqhihimanit. Taimaa 10nik ukiunik, hilaup aadlangurninnga tamainni Ukiuqtaqtumi aadlanguqtitait nanuit nayugangit aadlatqiiktumik nampanik. Pitariangi naamaktumik nannut amigaitni ilangi ilaunit tapkununga uumatyutit atuqpiaqni piyaunginnalaqnit niqikhanut piqaqnit tahapkununga Inuit, naunaiyainiq naunaiyaut munarinilu naunaiyautit havariyauyut naunairiangi amigaitni ilangi qanuritni aulatauninutlu ihumagini piyakhai. Hamani tuhaqhitautivut tapkuat qanuritni amigaitni naunaiyaut tapkununga nannut nayuqpaktat Tariunga Boothia (GB) havariyauyuq 2015-2017. Nutaat uuktuutingit katitiqtauyut aturhutik mikitqiamik-pittailiniq ihariagiyainnik niqinginnik piiyaqtauniq kapuqtauyut nutqaqtihimaittumik akhuraalukluuniit pilugit nanuit. Qauyihainivut ilalik 2015-2017 uumatyutit naunaiyautit tuhagakhat, uumatitlugit-tiguyauni tuhagakhat katitiqni atuqhugit hanatyuhikhat naunaiyaqni 1998-2000, uumatitlugit-tiguyauni tuhagakhat katitauni pilalirangata 1976-1997, angutauyutlu utiqtitni tuhagakhat tamaitnut pivigiyaini 1976-2017. Qanuritni uumatitlugit-tiguyaunituqungayut-utiqtitni pityuhit ihuaqhihimayut tapkunani Havagut MARK piniraqtai anginiqhamik amigaitni mikhautni tapkuat 1525 (atuqpakni ulamniqni [SE] = 294) pivigiyanut 2015-2017 ayyikkutapyagiya anginiqpaq amigaitni talvani 1998-2000 (1610 [SE = 266] uumani naunaiyaut; 1592 [SE = 361] talvani Taylor et al. [2009]). Anginiqpaq piarait-ukiumun tapkuatlu ukiulgit piarait aktilangi pivigiyanut 2015-2017 tapkuanguyut 1.61 (95% nalungitninut akunit [CI] = 1.51-1.70) tamnalu1.53 (95% CI = 1.41-1.64), tuklirinut, pitquhiqaqungitnit hutqikni tapkuat 1998-2000. Tamna anginiqpaq qaphiuni ukiulgit atuni iniqnit aqnallut pivigiyanut 2015-2017 tamnauyuq 0.36 (95% CI = 0.26-0.47) tapkuat piniraqtai tamna Tariunga

Boothia tatya piruttiaqtut nannut amigaitni ilangi, pigaluaqtitlugu tariup hikua allanguqnia. Una malikhaqmiya naunaiqtavut tapkuat nannut timingi qanuritni (naunaipkutariplugu, uqhuqaqnit) upingami ilagiaqtut akungani pivigiyai 1998-2000 tamnalu 2015-2017. Naunaiqtavut aqnallut anguhallut- ukiungilu-tainit allatqit katitlugit annaumani aktilat (naunaipkutariplugu, ilautitlugit angutat tuqutaunit) puqtutqiyautitlugit mikhautni iniqnit aqnallut (0.95; 95% CI = 0.81-0.99) tapkunangaunganit iniqnit anguhallut (0.85; 95% CI = 0.74-0.92) pivigiyanut 2005-2017. Atulaq turangayuq aktuania naunaiqtauyuq ilagiaqni avikhimaninut amigaitni qnallut talvanga 0.57 talvani 1998-2000 tikitlugu 0.61 talvani 2015-2017. Tamna ayyikkiququi, taittiaqni amigaitni aglivaliani aktilat kititni atuqhugit kitityutit pinahuginit uuktut mikhauttaqnigut katitlugit annaktut tamnauyuq 0.06 (95% CI = -0.06-0.12) pivigiyanut 2005-2017, piniraqhugit akhut aglivalialaqni. Kihimik, qanuritnivut amigaitni ilangi aktilat pitquhitlu tukiliuqtakhat munarilugit piplugu mikhautnivut amigaitninut pihimani tapkuat “amigaitniqpanguni” (naunaipkutariplugu, ilalgit tamaita nannut atuqtat Tariunga Boothia aulatauvia inaa, ilangi nayuqtat ahii amigaitni ilangiluttauq) mikhautavutlu amigaitni aglivaliani aktilat piyaungittut ahiningartaqnit taphumanga Tariunga Boothia aulatauvia inaa. Tamaitnut, nalvaqtavut piniraiyut tapkuat amigaitni qanuritnit taphuma Tariunga Boothia amigaitni ilangi tatya nakuuyut, pinahuaquigaluaqhuta pukkitqiyat mikhautnit katitninut angutaungittutlu annaumani anguhalluit nannut naunaiyatqikharialgit. Pinahugiyavut tapkuat akuttuni mikhivallilaknilu tariup hikua piqarutaulat nuktiraqninut ikayuqtat tamna Tariunga Boothia amihuni ilangi piplugu ilagiaqni uumatyutit piaraniktaqni. Hilap allanguqnia tamna pityutauniqhaq hivituyumun hivuranauta nannut nayuqpaknitlu avataanut Tariunga Boothia amigaitni ilangi ihuittumik aktualaqni hikuiqpalianginnaqat, taimattauq ilai nannut amigaitni ilangi, tatya naunaqmata. Una naunaiyaut kivgaqtuta aipanik hanatyuhit amigaitni naunaiyaqni tapkunani 22 ukiut tahamunga Tariunga Boothia amigaiti ilangi. Piplugit atuqhimani piyauyut atuqhugu una naunaiyaut qauyihaqnitlu, tuniyavut qaphit aturahuaquni ihumagiyauyukhat parnaiyaititlugit hivunikhami nannut amigaitni naunaiyautit. Aturahuaquyavut katitiqni ilagiarutit tuhagakhat mikhaani qitqani akungani parnakhimayat amigaitni ilangi naunaiyaqni. Uumani piplugu, tamna piya mikhaani 5-7 ukiut talvanga 2017 iniqtauni maniqami havat. Ilagiaqhugu, pigaluaqtitlugit aturahuaquni nuktiraqnit tuhagakhat nutaungittut, huli pinahuaquyauqpiaqtuq tapkununga amigaitni ilangi ilihimayqnut himmiqtautai nannut akungani inait. Piqangititlugu qangattaqhimayunik takukhautitni tuhagakhat nannut nuktiraqnit, havarinia angiyumik-qauyihaqni naunaiyautit himmiqtautai akungani Tariunga Boothia hanianilu amigaitni ilangi (naunaipkutariplugu, Lancaster Hanikgakhik, Tariunga Boothia, tamnalu M’Clintock Kangikhuakyuk) ikayulat naunairutai ilai naunaqtut piplugu ilikkut amigaitni ilangi tahapkuat inait. Kingulliqpamik, pikpat pivikhait, piqaqni, aulataunilu ihumagiyauyut piyaqaliqturini, aturahuaquyavut havarini amigaitninut angutat hivuranaqni naunaiyaqni tuhaqhittangi ihuaqhihimani angutat puqtunit.

2. INTRODUCTION

Wildlife managers face complex decisions when seeking to balance conservation and human priorities. Decisions and outcomes must be evaluated periodically so that new information can be fed back into an adaptive management framework (Holling 1978, Lancia et al. 1996, Johnson 1999). Accurate and up-to-date estimates of population abundance are often a key component of informed management decisions (Nichols and Williams 2006). Typically, new estimates of abundance are acquired periodically according to a monitoring interval that is determined by management objectives, resource availability, and species' biology (Gibbs 2008). As climatic changes affect many areas around the globe, shortened monitoring intervals may be required to understand the concurrent effects of management interventions and environmental change. Broadly, more frequent monitoring can increase the probability of meeting management objectives and reduce the severity of potential negative outcomes resulting from mis-specified management interventions (Taylor et al. 2007, Regehr et al. 2017).

One species that has received significant monitoring attention is the polar bear (*Ursus maritimus* Phipps 1774). Polar bears are characterized by having delayed maturation, small litter sizes, and high adult survival rates (Bunnell and Tait 1981). They are apex predators and as such bioaccumulate environmental contaminants (e.g., Derocher et al. 2003, Fisk et al. 2009, McKinney et al. 2009, 2011, Letcher et al. 2010, Routti et al. 2019). As a circumpolar species that depends on the sea ice for hunting, travel, mating, and in some instances denning (Amstrup 2003), sea ice loss resulting from climate change is predicted to impact polar bear subpopulations severely (Derocher et al. 2004, Stirling and Parkinson 2006, Amstrup et al. 2008, Durner et al. 2009, Stirling and Derocher 2012, Atwood et al. 2016, Regehr et al. 2016). The global polar bear population, consisting of 19 subpopulation units, is estimated to be approximately 26,000 polar bears (Obbard et al. 2010, Wiig et al. 2015). Currently there is no empirical evidence for declines in global abundance due to sea-ice loss (Regehr et al. 2016). However, some subpopulations have exhibited negative effects resulting from climate change (e.g., Bromaghin et al. 2015, Lunn et al. 2016) and accurate assessment of global changes is complicated by poor data for many polar bear subpopulations (Durner et al. 2018, Hamilton and Derocher 2018), spatial and temporal variation in the effects of sea-ice loss (Rode et al. 2014), and the fact that some subpopulations have likely recovered in recent decades from overexploitation prior to the 1973 Agreement on the Conservation of Polar Bears (Honderich 1991, Larsen and Stirling 2009).

Despite the on-going research and monitoring efforts, reliable and updated abundance and demographic information about all subpopulations is still lacking (Obbard et al. 2010, Vongraven et al. 2012). Polar bear research is expensive and logistically challenging, especially for management jurisdictions that oversee multiple subpopulations. Nunavut, Canada, is home to 12 subpopulations (8 shared with other jurisdictions, 4 entirely within Nunavut; Obbard et al. 2010) and as such carries the major responsibility of polar bear research in Canada. In order to maintain healthy and viable polar bear subpopulations, population studies in Nunavut are carried out on average within a 10 - 15-year rotational cycle, which can vary depending on research needs, priorities, and available resource (Hamilton and Derocher 2018). Here we present findings from a 2015 - 2017 study to estimate abundance and evaluate the demographic status of the Gulf of Boothia (GB) polar bear subpopulation.

Gulf of Boothia (GB) is a relatively small polar bear subpopulation area that is entirely managed by Nunavut (Fig. 1). An initial physical mark-recapture study was carried out from 1973 - 78 for the M'Clintock Channel (MC) and the adjacent GB subpopulations, although at the time it did not identify these as separate management units. The total abundance estimate for both areas was 1081 bears (Furnell and Schweinsburg 1984, Urquhart and Schweinsburg 1984). The estimate was known to be biased by non-representative sampling and was subsequently increased to 900 for GB and 900 for MC (Furnell and Schweinsburg 1984, Aars et al. 2006) based on the fact that the entire area was sampled, and the knowledge of Inuit local hunters about polar bear abundance in the broader study area (Derocher et al. 1998, Aars et al. 2006).

The GB and MC subpopulations were later delineated based on movements of satellite radio-collared adult female bears, recoveries of research tags in the harvest (Taylor and Lee 1995, Taylor et al. 2001), Inuit knowledge about how local conditions may influence the movements of polar bears (Keith et al. 2005), and genetic analyses (Paetkau et al. 1999, Campagna et al. 2013, Malenfant et al. 2016).

Prior to this study, the most recent population inventory work for GB was completed in 2000, where abundance (mean ± SE) was estimated to be 1592 ± 361 polar bears (Taylor et al., 2009). Based on those results, the population was considered stable or very likely increasing during the early 2000s due to a high intrinsic growth rate and relative low harvest levels (Taylor et al. 1987, 2009, Durner et al. 2018). However, harvest rates for GB increased from an average of 40 bears per year (with a Total Allowable Harvest [TAH] of 41) as reported by Taylor et al. (2009), to 62 bears per year (22 females and 40 males on average annually with a TAH of 74 starting in 2004/2005; Government of Nunavut (GN), unpublished data), between 2005 and 2017 (GN, unpublished data). How this change in harvest may have affected the GB subpopulation abundance and status is unclear.

Polar bears in Nunavut are managed through a co-management system and memoranda of understanding (MOU) between each community’s Hunters and Trappers Association and the territorial government[1]. These MOUs lay out harvest, management and research aspects for each polar bear subpopulation. Under the existing 2005 MOU, the GN committed to begin a new population study for GB in 2015. The new study had the objective to estimate the current subpopulation size and composition, and to compare these results to the former study. In addition, we sought to obtain data that would provide estimates on survival and reproductive parameters that can be used in population viability analyses and a quantitative harvest risk assessment. Lastly, by implementing a research method that was minimally-invasive and supported by local communities and stakeholders, we sought to evaluate whether genetic mark-recapture

[1] As of September 2019 the Nunavut Polar Bear Co-Management Plan is replacing the Memoranda of Understanding.

can be compared with traditional capture mark recapture studies previously done in GB in order to establish longer term trends for population monitoring (Vongraven and Peacock 2011, Vongraven et al. 2012).

3. STUDY AREA

The GB polar bear subpopulation lies entirely within Nunavut and encompasses an area of approximately 67 000 km^2 (excluding land; Taylor et al. 2001, 2009, Barber and Iacozza 2004, Hamilton and Derocher 2018; Fig. 1). The management unit is bound by the Boothia Peninsula to the west, and Brodeur Peninsula to the east. The geography of the study area is described in Schweinsburg et al. (1981). The current management boundary is mainly based on telemetry data for adult female bears that were fitted with radio-collars, tag returns from harvested bears (Schweinsburg et al. 1982, Bethke et al. 1996, Taylor et al. 2001), and genetic analyses (Campagna et al. 2013, Malenfant et al. 2016). Validity of the current boundary has been questioned by Inuit local knowledge (Keith et al. 2005).

Sea ice generally begins to form in early October and persists until July or August in most areas of GB (Schweinsburg et al. 1981). The most southerly area of GB, namely Committee Bay, remains mostly ice-covered throughout the year (Barber and Iacozza 2004). The presence of various ice types such as mobile, multi-year rubble, and first-year ice creates diverse seal habitat across GB (Barber and Iacozza 2004). Recent sea ice and climate data analyses indicate that the Arctic sea ice quality and abundance has changed during the past 30 years and that in most polar bear subpopulations, the sea ice melts sooner and forms later than in the 1980s (Stroeve et al. 2012, Stern and Laidre 2016, Regehr et al. 2016, Environment and Climate Change Canada 2019). Currently, sea ice persists across GB to various degrees throughout the year, but it is predicted that GB may be ice-free for 5 months each year by the late 21st century (Hamilton et al. 2014).

4. METHODS

Sampling – field collections

Our 2015 - 2017 study design was informed by the previous physical mark-recapture study conducted in GB 1998 - 2000 (Taylor et al. 2009; Fig. 2), although our study did not involve the immobilization and physical handling of bears. Inuit co-management partners in Nunavut expressed concern over wildlife capture and handling during a wildlife symposium in 2009 (Lunn et al. 2010, Department of Environment 2013). As a result, the responsible government management agency explored alternative research methods. Given the generally low densities of bears on the sea ice and the vast study area, genetic mark-recapture was selected since it is minimally invasive (Garshelis 2006) and has been successfully applied on various species, including bears (Brown et al. 1991 (right whales [*Eubalaena glacialis*]), Palsbøll et al. 1997 (humpback whales (*Megaptera novaeangliae*)), Boulanger et al. 2004, Olson 2009 (brown bear (*U. arctos*)), Pagano et al. 2014, SWG 2016 (polar bear)). From 2015 - 2017, our biopsy darting sampling sessions occurred between April to late-May each year where we searched the sea ice and near-shore areas for bears across the entire study area. We allocated approximately 100 hours of helicopter time for each field season to search for bears. We obtained genetic material for individual bears from a small sample of skin and hair collected via a remote biopsy dart (Pneudart Type C - Polar Bear) fired from a dart gun (Capchur Model 196) from inside a Bell 206 Long Ranger helicopter (Pagano et al. 2014). The extracted DNA was used to identify individual animals without the need for ear-tagging or lip-tattooing, which are typical methods for individual identification during live-capture studies (see section “Genetic analyses”). Recaptures occurred when a previously sampled bear was biopsy-darted on a later occasion or when a genetic sample was recovered through the Nunavut polar bear harvest-monitoring program. Every hunter in Nunavut is required to submit samples from each polar bear harvest so that age, gender and various other variables can be used in ecological and demographic assessments (Nunavut Wildlife Act, SNu 2003).

Search areas were initially discussed with hunters and local Hunters' and Trappers' Associations during pre-study consultations to gain insight about sea-ice conditions and bear distribution. We also took past capture locations (Taylor et al. 2009) into account when searching the sea ice, adjacent coastal areas, and small islands of our study area (Figs. 2b and 3).

Searches for bears were conducted at approximately 100 - 120 m above sea level, and at average speeds between 120 - 150 km per hour. To minimize potential sampling bias, and to allow replication of this study, we used a semi-structured sampling approach. Generally, we flew transect lines across the sea ice and small islands with search intensity proportional to apparent bear activity (or bear presence). When signs of bears (e.g., tracks, bears, seal kills) were rare or plentiful, search transect lines reflected that with further (i.e., 11 - 16 km) or nearer spacing (i.e., 7 - 10 km), respectively. In that fashion, we were able to cover large sections of the study area efficiently (Fig. 3). We decided to fly our survey transects from east to west and vice versa whenever possible, and to be perpendicular to suspected density gradients based on local knowledge, past capture and hunter-provided harvest locations.

Once we located a bear, a small sample of tissue (<5 mm diameter), mostly skin with some adipose tissue attached to it (Pagano et al. 2014), was taken using a biopsy dart. All bears except cubs-of-the-year (C0s) were darted in the rump area from an approximate distance (or altitude) of 3 - 7 m. C0s in early spring are still small and easily confused (Atkinson and Ramsay 1995, Robbins et al. 2012), and therefore were not darted to avoid possible injury and the splitting-up of family groups. Every bear that was biopsied received a unique field identification number so that the genetic results and our field data could be cross-referenced and linked.

The biopsy darts are designed to fall to the ground after impact and can be retrieved without handling a bear. The effectiveness of these darts for sampling polar bears has been previously demonstrated (Pagano et al. 2014, GN, unpublished data and reports, SWG 2016). The darts are quick and easy to use and require less pursuit of bears than live-capture operations. On average, it took less than 4 minutes from when a bear was initially spotted to the time when the dart was picked up after darting a bear (GN, unpublished data). The design and relatively low velocity of the dart means that risk of injury to a bear is minimal. Typically, bears show no or very little response to the impact of the dart and are left with no obvious visible mark. In order to facilitate easy spotting of darts on the ice or in deeper snow, a 10 - 15 cm long and ~2 cm wide strip of brightly colored flagging tape (C.H. Hanson, Naperville, IL; or Johnson, Montreal, PQ) was tied and wrapped around the distal end of the dart.

In addition to collecting the biopsy sample, we recorded the date, time and location of each observed bear (or group of bears), body condition based on visual assessment using a standardized fat index (e.g., Stirling et al. 2008; a scale from 1 - 5 with 1 being skinny, 3 average and 5 obese), specific markings or characteristics, group size or litter size, the estimated field age class (e.g., C0, yearling (C1), 2-year old, subadult [approx. 2 - 4 years], adult [approx. ≥ 5 years]) and estimated gender. Both field age-class and gender estimated included a confidence qualifier (i.e., a = high confidence; b = low confidence). Field age-class and gender throughout this project were assessed remotely from the helicopter at altitudes between 3 - 7 m by four experienced observers. When we encountered mothers and their dependent young, we distinguished C0s, C1s, and 2-year old offspring based on their size relative to their mother and physical features (e.g., blood or fecal/urine stains, scars) to a) assign them to a field age class, and b) avoid sampling the same individual more than once. Additional cues such as body size of the individual bear in relation to its surrounding or group members, body shape and proportions, presence of scars, secondary sexual characteristics, observation of urination, and gait were all used to estimate gender and age-class. Genetic microsatellite analysis was used later to confirm the gender of each sampled bear (see section Genetic analysis).

When field age class and gender of a bear were initially assessed with low confidence, additional field notes were taken. For example, young subadult male bears and younger adult females are at times difficult to discern from the air when they are solitary. If we thought that the encountered bear was a young adult female, but were uncertain (e.g., confidence classifier “b”) then we also noted what this bear could be as alternative – in this case “maybe a young subadult male”. When genetics confirmed the field estimate of sex, we assessed the identity of the bear as recorded initially. If the genetics returned a different sex, we reviewed our notes and concluded that the bear, in this example, must have been a young subadult male. Lastly, we recorded factors that may have influenced detection probability during sightings, including weather conditions (e.g., cloudy, clear, sun glare), bear activity when first observed, and sea-ice characteristics in general and within the immediate vicinity (~ 30 m) of an individual bear that may affect detection (e.g., sea ice type: flat, intermediate, rough multi-year ice).

Our work combined data collected during the genetic biopsy sampling sessions from 2015 - 2017, data from the previous capture-mark-recapture study conducted between 1998 - 2000, sporadic live-captures conducted from 1976 - 1997, and harvest recovery data for the entire period 1976 - 2017 (Peacock et al. 2012).

Sampling – recovering previously marked bears through harvest

To detect the recovery of previously individually identified bears (e.g., when bears were marked either during the initial mark-recapture study from 1998 - 2000, or from a previous biopsy-darting field season) by hunters, small muscle tissue samples were collected from all bears harvested in GB and surrounding subpopulations such as MC, Lancaster Sound (LS) and Foxe Basin (FB) throughout the duration of the current biopsy darting study (i.e., April 2015 - May 2017). Polar bear harvesting occurs throughout the year and these samples were stored in 2 ml cryovials (ThermoScientific, Nalgene long-term storage cryogenic tubes) at - 20˚C after submission to our laboratory until sample preparation and analyses.

Sampling - recovered bears from past population study

We examined captures and recaptures from the 1998 - 2000 population inventory, removed bears that we knew were dead (e.g., through a recovered ear tag or tattoo by harvest) and selected the remaining individuals that could be still alive (e.g., ≤ 34 years of age) in 2015 for genetic analyses. Samples (e.g., ear plugs from punching a hole through the pinna so that unique identification ear tags can be applied) of captured and re-captured bears from the initial study had been stored in cryovials at - 20˚C until preparation for genetic analyses.

Sample preparations

We used the same method to prepare all field and laboratory tissues or biopsy samples. Briefly, a lentil-size piece of skin (~ 1 - 1.5 mm thick) or tissue was obtained from either the biopsy sample, the ear plug, or the muscle tissue using a scalpel blade (# 20) then transferred onto a shipping card (Avery, 70 x 35 mm) and attached with scotch tape. Each sample card was labelled with the unique bear identification number, placed into a coin envelope (57 x 89 mm), and left to dry at room temperature for up to 3 days. The dried specimens where then sent to Wildlife Genetics International Inc. (Nelson, British Columbia) for individual genotyping and sex determination.

Genetic analysis

DNA was extracted from tissue with QIAGEN DNeasy Blood and Tissue Kits (Qiagen, Inc.). The tissue samples were genotyped at eight previously published dinucleotide microsatellite loci (REN145P07, CXX20, MU50, G10B, G10P, G10X, MU59, G10H; Paetkau and Strobeck 1994, Paetkau et al. 1995, 1998, Taberlet et al. 1997, Breen et al. 2001, Ostrander et al. 1993). Analysis of individual identity followed a 3-phase protocol previously validated for bears and described elsewhere (Paetkau 2003, Kendall et al. 2009).

To select markers for the analysis of individual identity, we used allele frequency data from approximately 1700 polar bears for which complete 20-locus genotypes existed before the genetic mark-recapture study began (GN, unpublished data). We ranked the 20 microsatellite markers in the dataset by expected heterozygosity. The eight most variable markers that could be analyzed together in a single sequencer lane were selected for use. These surpassed the required standard for marker variability (Paetkau 2003). In addition to the eight microsatellite markers, we analyzed sex, using a *ZFX*/*ZFY* marker. We searched the dataset for genotype matches that seemed unlikely based on our field data. In each case, three extra markers were added to the genotypes to lower the probability of chance matches between individuals. The extra loci confirmed these matches. Once the genotyping and error-checking was complete, we defined an individual for each unique eight locus genotype.

Sea-ice metrics

Other population studies have identified relationships between the spatial and temporal availability of sea ice and demographic parameters for polar bears (Regehr et al. 2007, Rode et al. 2012, Laidre et al. 2020). March and September mean ice concentrations were calculated for the entire GB area for each day sea-ice data were available and then averaged across 1979 - 2016 (Environment and Climate Change Canada 2018). We calculated the number of days between the sea ice retreat and sea ice advance in calendar year t using the transition dates when ice concentration dropped below, and exceeded, respectively, the midway point of sea ice concentration between the March and September mean (Environment and Climate Change Canada 2018). For the GB area, this transition sea-ice concentration was 63% (Environment and Climate Change Canada 2018). We describe the annual interval that sea-ice concentration was below the transition threshold as the “low-ice days” (Fig. 4). To evaluate the potential relationships between sea ice and the status of GB polar bears, we analyzed several metrics (e.g., body condition, recruitment, and survival) of bears in year t as a function of the duration of low-ice days in year t-1.

Body Condition Score

We compiled body condition score (BCS) data from two distinct time periods of mark-recapture population sampling in GB. Bears were assigned a BCS on a scale of 1 - 5 with 1 being skinny and 5 being obese (Stirling et al. 2008) through physical handling and capture (1998 - 2000) or aerial observation during biopsy sampling (2015 - 2017). All BCS observations occurred in April and May. Sex, age, and reproductive classes were assigned during physical handing during 1998 - 2000 and ages were determined based on previous capture history, known birth year, or from tooth analysis (Calvert and Ramsay 1998). During the biopsy sampling period, classification was done at approximately 3 - 7 m above the ground with sex verified by subsequent genetic analysis (SWG 2016). Observers who participated in classifying age class and sex during biopsy sampling had either participated in both sampling periods or were experienced in physical capture-mark-recapture studies.

The BCS raw scores were binned into 3 classes: ‘poor’ (1 - 2), ‘average’ (3), and ‘good’ (4 - 5) to follow recommended monitoring schemes (Stirling et al. 2008, Vongraven et al. 2012) and facilitate comparison with other studies (SWG 2016, Laidre et al. 2020). Like previous studies, we did not include dependent offspring in the BCS analyses because their body condition is dependent on maternal condition (SWG 2016). We excluded within-year observations of the same individual but retained observations of the same individual in different years.

We modeled BCS using ordinal logistic regression (Venables and Ripley 2002) and included *period* as an indicator of sampling period (early = 1998 - 2000 or late = 2015 - 2017). Reproductive status, age, and sex were combined into the four-level categorical variable *reproclass* (ADM = adult male, ADFI = independent adult female, ADFWO = adult female with offspring, and SUB = subadults of both sexes), and sampling day of year (*jul_cap_day)* were included as a continuous covariate to reflect the amount of time bears had on their preferred sea ice hunting platform before being sampled in year *t*. The sampling periods in this study also coincided with the annual seal pupping period, which is known to be prime feeding period for bears (Pilfold et al. 2012, Reimer et al. 2019). Thus, we predicted that increased time on the ice prior to sampling would be associated with higher BCS. The number of low-ice days (*icetm1*$_{t-1}$) was included to evaluate the hypothesis that interannual variation in BCS was related to sea-ice availability in the previous year. We selected a global model that reflected biological and environmental variables we hypothesized, or that have been shown in other studies, to be related to BCS (Rode et al. 2012, SWG 2016, Laidre et al. 2020). Finally, given our interest in evaluating whether different reproductive classes and genders had varying BCS based on the amount of time they spent on the sea-ice during the months immediately prior to observation (*jul_cap_day)*, and whether this relationship was different between our two sampling periods (*period)*, we included a three-way interaction between *reproclass, jul_cap_day,* and *period.* Once the global model was selected, we performed a backwards and forwards model comparison (stepAIC; Package MASS in the R programming language [R Core Team 2019]) to obtain the best-supported final model (ΔAIC < 2) (Table 1). We performed Lipsitz and Hosmer-Lemeshow tests to evaluate fit of the global ordinal regression model ($p > 0.1$; Fagerland and Hosmer 2017). Best-supported model covariates were considered significant at $p < 0.05$ (Wald X^2 tests) and predicted probabilities for each BCS class were calculated based on the suite of final-model covariates.

Reproduction

We evaluated reproductive indices for polar bears in GB using data from physical captures 1998 - 2000 and biopsy sampling 2015 - 2017. We used reproductive metrics that have been identified as important for monitoring polar bears (Vongraven et al. 2012). First, we C0 and C1 litter size as a function of biological, environmental, and temporal factors using logistic regression. We considered litter size (*ls*) for adult female *i* in year *t* to be a binary response variable (i.e., ls_{it} = 1 or 2). Analyses for C0 and C1 litters were performed separately using a three-step modeling approach, although we note that the C0 and C1 litter size data were not independent due to potential repeated measures and correlations (i.e., C1 litter size in year *t* is likely a function of C0 litter size in year t-1). We created a general model that included the main hypothesized sources of variation in the data. General models were simple due to small sample size. To ensure the general model was a suitable starting point for model selection, we evaluated goodness-of-fit (GOF) using Hosmer and Lemeshow tests (Hosmer et al. 2013). Second, we developed a candidate model set representing all combinations of main effects and interaction terms in the general model, with a marginality constraint to ensure that interactions were only included if the corresponding main effects were included. Third, we performed model selection using Akaike's Information Criterion adjusted for small sample size (AIC_c) and then estimated model-averaged parameters for all models with $\Delta AIC_c < 4$ (Burnham and Anderson 2002). Modeling was performed in the R programming language version 3.5.2 (R Development Core Team 2016) using package *MuMIn* (Bartón 2018) for multi-model inference.

The general model for C0 litter size was $ls_{it} = \beta_0 + \beta_1\, period_{it} + \beta_2\, icetm1_{it} + \beta_3\, BCS_{it} + \beta_4\, month_{it} + \beta_5\, period_{it} \times month_{it}$, where $period_{it}$ is a two-level factor indicating whether the observation of adult female i in year t was in the early or late period (1998 - 2000 and 2015 - 2017, respectively); $icetm1_{it}$ is the duration of the low-ice days in calendar year t-1 (see section Sea-ice Metric) for a polar bear observed in calendar year t; BCS_{it} is a three-level factor representing the body condition score of the adult female at the time of observation (see section Body Condition Score); $month_{it}$ is a two-level factor indicating whether a bear was observed in April or May; and $period_{it} \times month_{it}$ is an interaction term allowing the month effect to potentially differ between the early and late periods (e.g., because within-year temporal variation in litter size could change due to changes in sea-ice conditions, den emergence date, etc.). We hypothesized that litter size would be negatively correlated with *icetm1* (Laidre et al. 2020), positively correlated with *BCS* (Derocher and Stirling 1998), and negatively correlated with *month* because observations later in the spring reflected additional time in which cubs could die.

The general model for C1 litter size was $ls_{it} = \beta_0 + \beta_1\, period_{it} + \beta_2\, icetm1_{it} + \beta_3\, BCS_{it}$, where definitions of the predictor variables are the same as in the model for C0s.

We did not include the predictor $month_{it}$ because individual C1 survival is generally high (e.g., Regehr et al. 2017) and we did not expect litter size to change between April and May.

After evaluating patterns in litter size, we calculated the mean number of dependent young (C0 or C1) per adult female and evaluated differences between time periods. We also evaluated litter production rate, defined as the proportion of adult females that are available to breed in year *t* that produce a litter of C0 in year *t*+1 (Taylor et al. 1987). These metrics have been used as indices of productivity for other polar bear subpopulations (e.g., Peacock et al. 2013, Regehr et al. 2015). We quantified uncertainty using a nonparametric bootstrap procedure with 1,000 iterations during which observations of individual polar bears were resampled with replacement and the three reproductive metrics were calculated from the resampled data.

Survival

We used the Burnham capture-recapture model (Burnham 1993) in Program MARK (Cooch and White 2019) to analyze live-observation and dead-recovery data for the GB subpopulation. Live observations consisted of physical captures during which bears were assigned an individual identification number, or the identity of a previously captured bear was recorded; and biopsy sampling during which individual identification was determined from genetic analysis of a tissue sample (see sections above about recovering samples of bears through harvest and from the previous study). Live observations were conducted under random sampling protocols that attempted to search the entire area within the GB subpopulation boundary in 1998 - 2000 (physical captures) and 2015 - 2017 (biopsy sampling). Additionally, bears were physically captured and released each year 1976 - 1978, and sporadically during the period 1979 - 1997. Because research conducted from 1976 - 1997 did not follow a sampling protocol designed to evaluate demography, we included initial captures from this period but did not include recaptures of previously marked bears. This approach has been used in other analyses (e.g., Taylor et al. 2009) to increase the number of marked bears without introducing heterogeneity into recapture probabilities, which can result in biased parameter estimates (Peňaloza et al. 2014). Because recaptures were excluded or did not occur in some years, within the Burnham model we fixed recapture probability to 0 in 1976 - 1997 and 2001 - 2014. Throughout the entire study period 1976 - 2017, dead-recovery data were obtained from hunter reports of research-marked bears and genetic analysis of tissue samples from bears that were harvested.

The Burnham model is a common choice for estimating survival and abundance of polar bears (SWG 2016). Parameters in the model are survival (S; the probability of surviving interval *t* to *t*+1), recapture probability (p; the probability of re-observing a live marked animal), dead reporting probability (r; the probability that an animal which dies is killed by humans and reported to authorities), and fidelity (F; the probability that an animal does not permanently emigrate from the sampling area and remains available for live observation in future years). We limited our analyses to bears age ≥ 1 year (i.e., C1s and older) because in the 2010s most C0s were not biopsy darted or individually identified.

We developed a candidate model set based on combinations of parameter-specific submodels, with the structure of each submodel informed by hypotheses about polar bear biology and study design. We considered 16 submodels for *S* (Table 2). The temporal factor *year* allowed survival to differ between 1976 - 2004 and 2005 - 2017. We chose these year blocks to evaluate the potential influence of habitat changes in the past decade (Environment and Climate Change Canada 2018) and because total allowable harvest (TAH) for the GB subpopulation was increased in 2004 (see section Introduction). The two-level factors *sex* (female vs. male) and *sub* (C1s and subadults [2 - 4 year] vs. adults [age ≥ 5 year]) were included to allow sex- and age-specific variation in survival (e.g., Regehr et al. 2007). The covariate *icetm1*, calculated the same as for reproductive analyses, was included to evaluate the hypothesis that interannual variation in survival was related to sea-ice availability in the previous year. We considered five submodels for *r* that included *sex* and *year* to reflect sex-specific harvest and potential changes in harvest mortality associated with changes in harvest level. The four submodels for p included *sex* to allow potential variation in recapture probability resulting from sex-specific habitat selection or movement patterns (Laidre et al. 2013), and *year* to accommodate different levels of sampling effort in the 1990s and 2010s. We did not include a submodel with annual variation in p because sample sizes were similar within each three-year block of intensive capture-recapture research. The four submodels for F included *sex* and *year*. Unlike Taylor et al. (2009), we estimated F rather than fixing it to 1 because bears captured in the GB management unit have been harvested in adjacent subpopulations, suggesting some degree of permanent emigration (see section Discussion - Abundance). Each submodel was constructed as a linear function, on the logit scale, of the various factors, covariates, and interaction terms discussed above. We fitted all possible combinations of the parameter-specific submodels in Program MARK (Cooch and White 2019) accessed through the R programming environment (R Core Team 2019) using the package RMark (Laake 2013).

We performed model selection and multimodel inference using $QAIC_c$ (Burnham and Anderson 2002). We used the overdispersion factor $\hat{c}$ = 1.2, calculated as the ratio of live observations of dependent cubs (i.e., C1s and two-year-old cubs still accompanying their mothers) to total live observations (Taylor et al. 2009). For validation, we derived a separate estimate of $\hat{c}$ using the parametric bootstrap procedure in Program MARK (Cooch and White 2019) with the general model *S*(*year*+*sex*+*year*:*sex*)*r*(*year*+*sex*+*year*:*sex*)*p*(*year*+*sex*)*F*(*sex*), where "+" represents an additive effect and ":" represents an interaction. The bootstrap estimate of $\hat{c}$ was 1.2, suggesting that our empirical estimate adequately reflected extrabinomial variation in the data. Model-averaged parameter estimates were derived from all candidate models with $\Delta QAIC_c < 4$. Our estimates of S reflected harvest mortality, so we derived estimates of un-harvested survival as $S^* = S + r \times (1 - S)$ (Peacock et al. 2013) and estimated variance via the delta method (Taylor et al. 2008). This equation assumes that harvest of all marked bears is reported, and that harvest mortality is additive (i.e., that no harvested bears would otherwise have died during a given interval).

Abundance

We used Horvitz-Thompson type estimators (McDonald and Amstrup 2001) to derive abundances in year *t* as $\widehat{N}_t = n_t/\hat{p}_t$, where n_t is the number of individually identified animals observed alive in year *t*, and $\hat{p}_t$ is a model-averaged estimate of recapture probability in year *t*. To estimate abundance of bears age ≥ 1 year we stratified the subpopulation by sex and summed the female and male estimates, which was necessary to accommodate sex effects in recapture probability. Finally, we adjusted annual abundances to include approximate numbers of C0s by adding the product ($\widehat{N}_t^{AFC0} \times \overline{ls}^{C0}$), where $\widehat{N}_t^{AFC0}$ is the estimated number of adult females with C0 litters in year *t*, and $\overline{ls}^{C0}$ is overall mean C0 litter size. We used the delta method to construct variance estimates for annual estimates of total *N* and for average estimates of total *N* over several years. In doing so, we assumed that estimates of recapture probability and C0 litter size were independent. Note that abundance estimates from a capture-recapture framework that allows permanent emigration, but not temporary emigration, may not represent the number of animals within the sampling area at a given point in time. Specifically, abundance estimates from the current study represent the "superpopulation", defined as the group of animals that are alive and have a non-negligible probability of occurring within the sampling area, regardless of their actual location at a particular time. In other words, the superpopulation estimate in year *t* reflects temporary emigrants (i.e., animals that are outside of the GB management unit in year *t* but may return in future years).

Population growth

We used estimates of *S* and *S** from live-recapture dead-recovery modeling, together with estimates of litter production rate and C0 litter size, to estimate intrinsic population growth rate (*gr*) using a 10-stage matrix-projection model based on the life history of polar bears (Regehr et al. 2017). Because we did not estimate C0 survival in the current study, we used the mean estimate of 0.889 (SE = 0.179) for the period 1976 - 2000 from Taylor et al. (2009) for all matrix calculations. We estimated var(*gr*) by generating

10,000 correlated samples of the input vital rates using the model-averaged variance-covariance matrix for sex- and age-specific estimates of survival. We assumed that the correlation structure for C0 survival was the same as for subadults, that litter production rate and C0 litter size had a correlation coefficient of 1, and that there was no correlation between survival and reproductive parameters. Estimates of *gr* represent asymptotic intrinsic growth rate at a stable stage distribution.

5. RESULTS

General overview

During research operations in 2015 - 2017, we spent an average of 103 hours of flying in April and May each year in search of polar bears across the sea ice, with an average distance flown per year of about 12,200 km (Table 3, Figs. 2 and 3). The number of bears encountered during each survey season was similar, with a mean of 170 observed bears per field season.

The GB study area is vast and consists of differing ice types (Barber and Iacozza 2004). The distribution of bears during the 2015 - 2017 study appeared to be more uniform across the study area as compared to 1998 - 2000 when bears were encountered in higher concentrations east of the Boothia Peninsula and near the west shore of Melville Peninsula (Figs. 1 - 3). Moreover, there appeared to be no bear encounters directly north of Committee Bay during the 1998 - 2000 study, in contrast to our recent observations. During both studies no bears were encountered in the lower section of Committee Bay (Fig. 2).

Samples examined

We collected a total of 406 biopsy samples during research operations in 2015 - 2017. Of these, 397 (97.8%) contained sufficient material for genetic analysis. We identified 10 GB bears that were previously captured during the 1998 - 2000 study (Taylor et al. 2009), and 1 LS bear that was 22 years old in 2017 when it was sampled. We also identified 7 individuals that were previously sampled during the MC study between 2014 - 2016. Overall, 324 individual bears were identified from these field samples. Some bears were resampled within the same season: 18 bears were sampled twice, 2 bears were sampled three times, and 1 bear was sampled four times (representing 5% of all successful samples). Re-sampling of the same individual within the same field season was low and likely occurred because weather prevented coverage of a large area within a short time frame, allowing bears to move over longer distances. Biopsy sampling leaves no visible marks on the individual animal as is the case with traditional mark-recapture studies (e.g., Peacock et al. 2013) thus it is impossible to avoid some re-sampling.

Through the harvest sampling program, we submitted 1704 samples between 2005 - 2017 from GB and neighboring subpopulations (338 GB, 701 FB, 402 LS, 47 MC, and 216 with unknown subpopulation) for genetic analyses. Twenty-five bears from the biopsy sampling sessions were harvested and recovered, as well as 8 previously marked bears from the 1998 - 2000 study. Those 8 bears were recovered in GB (6), MC (1) and LS (1). The 6 recovered bears in GB were identified through genetic testing because no ear tags and tattoos were reported.

Field sampling activities

Biopsy sampling activities on the sea ice went very well. The darts do not leave a mark when bears are darted in the rump, and most bears do not react to the impact of the dart. Many of the adult males move very slowly away once darted, if at all. The colored flagging tape attached to the end of the dart makes dart retrieval easy and quick.

During our survey flights, additional observers besides the pilot and biologist were on board the helicopter. In order to safely maneuver during darting, some observers had to be safely dropped off once a bear was seen to reduce weight, but before the darting activities began. It took the crew, on average, 4.3 min (± SE; 0.19; range: 2 - 8 min; n = 62) from the time a bear was observed for the first time (e.g., at times > 1 km from the helicopter) and when the additional observer was picked up again. The direct darting activities involving the safe approach of the bear, darting the bear, and dart retrieval took an average of 2.0 min (± SE; 0.11; range: 1 - 5 min; n = 62; GN, unpublished data).

Body condition score

Body condition scores were higher between 2015 - 2017 compared to 1998 - 2000 (n = 626; $\chi^2 = 5.5$, $p = 0.02$; Fig. 5, Table 4). This was reflected in a decrease in the proportion of bears in poor condition (P_{poor}) and an increase in the proportions of bears in average and good condition (i.e., $P_{poor} = 0.31$ for early period vs $P_{poor} = 0.07$ for the late period; Fig. 5; Table 4). Adult females with offspring ($P_{poor} = 0.28$) and subadults ($P_{poor} = 0.26$) were more likely to be in poor body condition compared to other age and reproductive classes (mean P_{poor} for ADFI and ADM = 0.11; $\chi^2 = 11.4$, $p < 0.01$, Fig. 6). For females with dependent offspring, increasing amounts of time on the ice before being sampled (*jul_cap_day*) was associated with higher BCS ($\chi^2 = 9.0$, $p < 0.05$).

In the early period, bears were more likely to be in poor condition as $icetm_{t-1}$ increased (*icetm* = 70 d: $P_{poor\ early\ period} = 0.24$ and *icetm* = 104 d: $P_{poor\ early\ period} = 0.39$; $\chi^2 = 13.5$, $P < 0.001$). The opposite was true in the late period; the probability of being in poor condition decreased as $icetm_{t-1}$ increased (*icetm* = 70 d: $P_{poor\ late\ period} = 0.12$ and *icetm* = 104 d: $P_{poor\ late\ period} = 0.03$).

Reproduction

We observed 99 adult females with C0 litters during intensive capture-recapture studies conducted in 1998 - 2000 and 2015 - 2017 (Table 5). The general model for C0 litter size provided an adequate fit to the data (Hosmer and Lemeshow test: $X^2 = 6.91$, $df = 8$, $P = 0.55$). The candidate model set included eight models with $\Delta AIC_c < 4$, from which model-averaged parameter estimates were derived (Table 6). Low importance scores (i.e., sums of normalized AIC_c weights for models that included a variable) indicated a lack of support for variation in C0 litter size as a function of our proposed predictor variables (Table 6). The low-AIC_c model included one parameter (i.e., intercept only; β = 0.43, SE = 0.21, P = 0.04). Overall mean C0 litter size was 1.61 (95% CI = 1.51 - 1.70).

We observed 80 adult females with C1 litters during intensive capture-recapture studies conducted 1998 - 2000 and 2015 - 2017 (Table 5). The general model for C1 litter size provided an adequate fit to the data (Hosmer and Lemeshow test: X^2 = 5.96, df = 7, P = 0.54). The candidate model set included five models with $\Delta AIC_c < 4$, from which model-averaged parameter estimates were derived (Table 7). Low importance scores indicated a lack of support for variation in C1 litter size as a function of our proposed predictor variables (Table 7). The low-AIC_c model included one parameter (i.e., intercept only; β = 0.10, SE = 0.23, P = 0.65). Overall mean C1 litter size was 1.53 (95% CI = 1.41 - 1.64).

The other reproductive metrics for GB polar bears were similar, or slightly lower, in 2015 - 2017 compared to 1998 - 2000. Mean number of C0s per adult female was 0.51 (95% CI = 0.39 - 0.64) for the 1990s and 0.43 (95% CI = 0.32 - 0.44) for the 2010s, which corresponds to a probability of 0.85 that values were smaller in the 2010s. Mean number of C1s per adult female was 0.37 (95% CI = 0.27 - 0.48) for the 1990s and 0.36 (95% CI = 0.26 - 0.47) for the 2010s, which corresponds to a probability of 0.54 that values were smaller in the 2010s. Mean litter production rate was 0.76 (95% CI = 0.48 - 1.0) for the 1990s and 0.64 (95% CI = 0.41 - 0.98) for the 2010s, which corresponds to a probability of 0.71 that values were smaller in the 2010s. Note that the ratio estimator we used to calculate litter production rate was different from the estimator used by Taylor et al. (2009), which required assumptions about litter loss and population growth rate.

Demographic analyses

Survival - The capture-recapture data contained 987 live observations of individually identified polar bears and 139 dead recoveries of research-marked bears during the period 1976 - 2017 (Table 8). The candidate model set included 1280 live-recapture and dead-recovery models representing combinations of the parameter-specific submodels. Of these, 104 models had $\Delta QAIC_c < 4$, indicating relatively high model-selection uncertainty. To evaluate the explanatory power of the various factors, covariates, and interaction terms in each parameter-specific submodel, we calculated importance scores defined as the sum of $QAIC_c$ weights for all submodels containing a given term (Table 9). Importance scores for survival (S) suggested strong support for a sex effect and for a step change between the year blocks 1976 - 2004 and 2005 - 2017, relatively weak support for an age effect, and little or no support for interannual variation in survival in relation to our sea-ice metric. Importance scores for recovery probability (r) provided weak to moderate support for a sex effect and a step change between year blocks. Finally, importance scores for recapture probability (p) and site fidelity (F) provided little or no support for sex or temporal effects.

Our model-averaged parameter estimates were consistent with patterns that would be expected based on the importance scores for the various terms (Table 10). Point estimates of un-harvested survival (S^*) increased for females, and decreased for males, between the year blocks 1976 - 2004 and 2005 - 2017. Point estimates for r decreased slightly for females and increased slightly for males. Point estimates of F ranged between 0.93 - 0.99, suggesting relatively high fidelity to the GB management unit. Due to sampling uncertainty and potential process variation, no temporal changes in parameter estimates were statistically significant at an alpha level of 0.05.

Abundance - Mean model-averaged estimates of total subpopulation abundance, including numbers of C0s, were 1610 (SE = 266) for 1998 - 2000 and 1525 (SE = 294, 95% CI = 949 - 2101) for 2015 - 2017. Based on a randomization procedure, this corresponds to a probability of 0.57 that abundance of the GB subpopulation was approximately stable or increasing (subjectively defined as $N_{2015-2017} \geq 0.9\times N_{1998-2000}$), and a probability of 0.43 that abundance was declining (defined as $N_{2015-2017} < 0.9\times N_{1998-2000}$). Our estimate of mean abundance for 1998 - 2000 was very close to the estimate of 1592 (SE = 361) for the same period from Taylor et al. (2009).

Population Growth – The time-constant estimate of asymptotic intrinsic population growth rate (*gr*) for the period 2005 - 2017, calculated using estimates of total survival (*S*), was 0.06 (95% CI = -0.06 - 0.12). The estimate of un-harvested growth rate for the period 2005 - 2017 was *gr* = 0.07 (95% CI = -0.05 - 0.13). This suggests a strong potential for growth in the absence of harvest, although precision was low. For the period 1976 - 2004, estimates of harvested and un-harvested *gr* were 0.03 (95% CI = -0.07 - 0.09) and 0.05 (95% CI = -0.04 - 0.10), respectively. Although comparison is complicated by different model structures and datasets, these values are similar to the corresponding point estimates of *gr* = 0.02 and 0.06 for the period 1976 - 2000 reported in Taylor et al. (2009).

6. DISCUSSION

General

The GB study area experienced drastic sea ice changes over the past decades (Barber and Iacozza 2004, Stern and Laidre 2016, Environment and Climate Change Canada 2018). The quantity of multi-year sea ice has declined across the Canadian Archipelago (Mudryk et al. 2018, Perovich et al. 2018, Richter-Menge et al. 2018) and the fall freeze and spring thaw cycles in GB changed significantly, extending the period between sea-ice retreat and sea-ice advance by 16 days per decade (Stern and Laidre 2016). Moreover, the mean summer sea-ice concentration (June to October) has been decreasing by 9% per decade (Stern and Laidre 2016). As recently as the 1980's, the GB region was characterized by 40 - 50% multi-year ice during the summer, but this amount has declined to less than 10% between 2011 and now (Environment and

Climate Change Canada 2018) and the shift is predicted to continue (Sou and Flato 2009, Hamilton et al. 2014). The observed changes from multi-year to annual sea ice result in declining sea ice thickness. Younger and thinner sea ice is more mobile and susceptible to mechanical wind forcing. Annual sea ice is also more vulnerable to complete melting in the summer which contributes to the observed decrease in summer sea ice extent. (Richter-Menge 2018, Perovich et al. 2018). This reduction in sea ice results in the absorption of more heat by the upper ocean (Richter-Menge 2018). While sea ice loss overall is considered detrimental to the persistence of polar bears, in the short term, it may have beneficial effects in some parts of the high Arctic since many of the observed sea ice changes have been associated with greater marine productivity (Derocher et al. 2004, Häder et al. 2014, Frey et al. 2018).

Abundance

Our estimate of mean abundance for the period 1998 - 2000 was 1610 (SE = 266), which is very similar to the estimate of 1592 (SE = 361) for the same period from Taylor et al. (2009). The new mean abundance estimate of 1525 (SE = 294) for the period 2015 - 2017 corresponds to a probability of approximately 0.57 that the GB subpopulation has remained approximately stable or increased despite observed sea-ice changes. We suggest that abundance estimates from 1998 - 2000 and 2015 - 2017 are likely an accurate portrayal of trends in abundance given the consistent methodology between the intensive capture-recapture efforts. Taylor et al. (2009) suggested that the subpopulation could sustain a quota increase from 40 to 74 bears per year which was instituted in 2004/2005. The 74-bear quota was rarely filled over the past 14 years with an average of 62 bears per year (22 females and 40 males) removed from the subpopulation. The sex ratio of removed bears was 64.3% male in keeping with the 2:1 sex selective harvest management system in place in Nunavut during that time (range: 56.7 - 72.1% male for the 2004/2005 – 2016/2017 harvest seasons; GN, unpublished data).

The mean point estimate of the proportion of females among independent polar bears (i.e., age ≥ 2 years) increased from 0.57 for the period 1998 - 2000 to 0.61 for the period 2015 - 2017. This appears consistent with the estimates of harvest recovery probability and the estimated differences in total, and un-harvested, survival between females and males. This finding may suggest that the selective harvest of polar bears at a 2:1 male-to-female ratio has resulted in a gradual depletion of adult males in the subpopulation, which is consistent with model-based predictions of declining male numbers under a sex-selective harvest (McLoughlin et al. 2005, Taylor et al. 2008, Regehr et al. 2015). We suggest that this effect could be mitigated by lowering the TAH while maintaining a sex-selective harvest. Alternatively, maintaining the current TAH, but switching to a 1:1 sex ratio for several years could also mitigate the gradual depletion of males but would increase the risks of overharvest given that adult female bears are the most important contributors to population growth (Eberhardt 2002, Hunter et al. 2010). We recommend that a more thorough harvest risk assessment be conducted to further investigate this and other issues related to the sustainability of current removal levels from the GB subpopulation (e.g., change in carrying capacity and environment over time; Regehr et al. 2017).

The GB study area has an estimated density of 8.9 bears per 1000 km^2 based on the current abundance estimate, which is the highest, currently known, density of polar bears within the subpopulation boundaries recognized by the IUCN Polar Bear Specialist Group (Durner et al. 2018). It is more than 5 times the median density of 14 subpopulations for which abundance estimates exist (Hamilton and Derocher 2018). It is also important to note that our estimates of abundance from the current study, as well as from the past study (Taylor et al. 2009), represent the “superpopulation”. A superpopulation is defined as all the animals with a chance (non-negligible probability) of occurring within the GB management boundary, regardless of where the animals were located at any given sampling occasion (e.g., Schwarz and Anarson 1996). Thus, estimates of superpopulation size in year *t* likely reflect some animals that were temporary emigrants in year *t*. We were not able to directly estimate temporary emigration from the sampling area (Cooch and White 2019) because our sample sizes were not sufficiently large to do so, and there are no recent radio-telemetry data to provide location and movement data. However, recoveries of previously marked bears in other subpopulations through the harvest sampling program indicate that movement into and out of GB is likely occurring (Fig. 7). Therefore, our estimates of abundance are likely larger than the actual number of animals within the GB subpopulation boundary at any given time. This should be taken into consideration when using these findings to inform management decisions. For example, if capture-recapture analyses are performed independently for multiple adjacent subpopulations that experience exchange of animals, the sum of the estimates of superpopulation size will be larger than the actual total number of bears in the subpopulations (i.e., there will be “double counting” of some bears). This could lead to cumulative TAH levels that result in removal of a larger proportion of polar bears each year than was intended based on the TAH levels for the individual subpopulations.

Population Growth

Our estimates of the population growth rate (*gr*) for the period 2005 - 2017 based on total survival (gr = 0.06) and un-harvested survival (gr = 0.07) for the 2010s are high for polar bears, suggesting strong capacity for growth. Our estimates of *gr* for the 1990s were similar to estimates from Taylor et al. (2009), although a direct comparison is complicated by statistical uncertainty and different modeling structures and datasets. Note that our estimates of *gr* for the 1990s had more statistical uncertainty than that of Taylor et al. (2009) because we accounted for covariance among demographic parameters, whereas it appears that Taylor et al. (2009) considered variation in the different demographic parameters to be independent.

The high estimates of *gr* from this study should be interpreted with caution because they are based on estimates of total survival. Therefore, they reflect the potential for biological population growth but not necessarily the trend in the numbers of polar bears that remain within the GB subpopulation boundary. Indeed, when the harvested population growth rate for the period 2005 - 2017 is recalculated using estimates of apparent survival (i.e., the probability of remaining alive and not permanently emigrating from the GB management unit) the point estimate is negative (*gr* = -0.024; i.e., suggesting that the number of bears within the GB subpopulation boundary may be decreasing). Direct interpretation is complicated by statistical uncertainty (e.g., the coefficient of variation for the estimate of *gr* based on total survival was 0.79). However, this may suggest that emigration from the GB region is one explanation for the apparently contradictory findings of (1) a lower point estimate of abundance for 2015 - 2017 compared to 1998 - 2000 and (2) high point estimates of *gr* for 2005 - 2017 that suggest the GB subpopulation was growing during this period. In other words, it is possible that high estimates of *gr* based on total survival do indeed reflect increasing numbers of bears (i.e., there are more births than deaths), but that a substantial proportion of these bears are permanently emigrating from the GB management area. As the ice becomes more dynamic in GB and the surrounding areas, bears may be more dynamic in their movements. Potentially high and variable levels of immigration and emigration across subpopulation boundaries can directly affect estimation and interpretation of population growth rate (Peňaloza et al. 2014). In some other subpopulation studies, radio-telemetry data have been critical to resolving these issues (e.g., Regehr et al. 2018). For regions where radio-telemetry is not available, we recommend that the best way to reconcile these interpretation challenges and provide accurate information to inform management is to perform a meta-analysis of the capture-recapture and harvest recovery data for all subpopulations within the region that are known to exhibit substantial levels of exchange (e.g., GB, MC, and LS).

Reproduction

Our estimates of reproductive indices (e.g., litter size, offspring per female) are on the higher end of the range of expected values for polar bears (Baffin Bay: SWG 2016, Foxe Basin: Stapleton et al. 2016, Western Hudson Bay: Dyck et al. 2017, Southern Hudson Bay: Obbard et al. 2018, Chukchi Sea: Regehr et al. 2018), suggesting that the GB subpopulation is currently capable of healthy reproduction. During our genetic biopsy sampling we were not able to collect data on the numeric age of most bears (i.e., through counting cementum annuli in teeth; Calvert and Ramsay 1998), hence we cannot comment on age of first litter for females or inter-birth intervals. However, our estimated number of C1 per adult female of 0.36 in 2015 - 2017 appears to be sufficient to maintain a viable subpopulation, provided that survival is within the normal range for healthy subpopulations (Regehr et al. 2015). The number of C1 per adult female (0.36 in this study) is considered a key reproductive parameter (Vongraven et al. 2012, Regehr et al. 2015) because it integrates cub production and cub survival. This is especially important when C0s cannot be sampled or handled, as in this study (see Method section above). Our estimates for 1998 - 2000 and 2015 - 2017 suggest that no significant change in recruitment occurred over time. Declines in reproductive performance in association with sea ice deterioration have been documented for some polar bear subpopulations (Derocher and Stirling 1995, Derocher 2005, Rode et al. 2010, Peacock et al. 2013, Rode et al. 2014). As spring sea ice break-up occurs earlier (which is also associated with later fall freeze-up; Stern and Laidre 2016, Regehr et al. 2016) feeding opportunities for polar bears presumably decrease, leading to poorer maternal body condition and reduced investment in reproduction. Despite changes in sea ice conditions over the past decades we did not detect any significant changes in reproductive output for GB polar bears, although if climate change continues as predicted (IPCC 2014) there will likely be a threshold beyond which reproduction declines (Laidre et al. 2020).

Survival

Opposite to what Taylor et al. (2009) found in their study, our estimated survival rates (total and un-harvested) demonstrated lower survival rates for males than females (Table 10). Estimates of total (i.e., including harvest mortality) survival for adult females of 0.95 for the period 2005 - 2017 were high relative to other subpopulations for which survival estimates are available (Regehr et al. 2018, their Table S3). However, direct comparison is complicated because most other estimates are of apparent survival which includes permanent emigration. Similar to our findings for the GB subpopulation, a recent study documented male survival rates to be reduced for the Baffin Bay subpopulation (SWG 2016). We are unaware of why un-harvested male survival may be declining for GB bears and we recommend this as an important area for research and monitoring. There also was moderate support for a time-period effect on survival, with total survival increasing for females and decreasing for males. This should be interpreted with caution because confidence intervals had substantial overlap. There was relatively low support for an age class effect in survival, with point estimates of survival lower for subadults than for adults, although again the CIs overlapped. No support for variation in survival as a function of the sea-ice covariates we explored was detected.

Estimates of un-harvested survival for adult females for the period 2005 - 2017 (0.97) were also high. When considered along with the reproductive indices, these findings suggest that the GB subpopulation remains capable of strong growth. As a note, estimates of total survival (*S*) reflect the probability of remaining alive. Estimates of *S* directly from the Burnham models are not estimates of apparent survival (i.e., the probability of remaining alive and not permanently emigrating) because the Burnham model directly estimates the fidelity parameter *F*. Unlike Taylor et al. (2009), we did not fix the fidelity parameter (*F*) to 1 (i.e., no assumed permanent emigration) based on the evidence of some movement from GB garnered from harvest recoveries. These factors suggest that there is some permanent emigration, which should be estimated to reduce potential bias in estimates of survival and abundance. Estimates of the parameter *F* ranged between 0.93 and 0.99 depending on sex and time period, with very large confidence intervals. Collecting movement data through radiotelemetry would provide better understanding of the movement into and out of the GB boundaries allowing more precise estimation of survival and abundance.

Body condition

Bears in GB were in better body condition in the most recent survey from 2015 - 2017 compared to the previous survey in 1998 - 2000. This is in direct contrast to some other subpopulation studies that have found decreasing body condition of bears in recent years (Rode et al. 2012, Stirling and Derocher 2012, SWG 2016, Laidre et al. 2020). However, polar bear subpopulation ecosystems vary widely. Within GB, multi-year sea ice predominated until recently (e.g., mid-1990s) when a shift to thinner, annual ice has occurred (Schweinsburg et al. 1981, Barber and Iacozza 2004, Howell et al. 2008, 2009, Sou and Flato 2009, Environment and Climate Change Canada 2018). This shift to annual ice may facilitate a short-term boost in hunting opportunities for bears as the ice is thinner and more prone to leads and cracks allowing access to bears' preferred prey, ringed seals (*Pusa hispida*). Indeed, we saw that in the recent time period, as the duration of low-ice days increased, bears were more likely to be in better condition. This is counterintuitive when thinking about polar bears' reliance on sea ice as a hunting platform. However, the GB ecosystem does not currently experience 100% ice-free periods and the low-ice days represented concentrations that were 63% or lower (see Methods: Sea-ice metrics) which are still within the range of preferred polar bear ice concentrations (Durner et al. 2009). It is worth noting that during the period 2009 - 2014 (Stern and Laidre 2016), the sea-ice area dipped to ~10%. Polar bears come onshore at concentrations of around 10-15% ice (Cherry et al. 2013) and thus, if sea ice coverage declines further, we may see a similar negative relationship of body condition and low sea ice concentration or extent as has been reported for other subpopulations (Regehr et al. 2007, Rode et al. 2012, SWG 2016, Laidre et al. 2020).

More favorable ice conditions relative to seal hunting, coupled with the seal pupping period that occurs roughly around mid-April, may account for our finding that body condition improved for bears sampled later in the field season (Stirling and Archibald 1977, Pilfold et al. 2014, Reimer et al. 2019). Females with offspring were much more likely to be in poor body condition compared to the other reproductive groups. When they were sampled earlier in the year, their probability of being in poor condition was highest which is unsurprising given the increased nutritional stress this reproductive class faces due to lactation and parturition. As time progressed, the likelihood of being in poor condition declined and they were more likely to be rated as ‘average’ suggesting that access to prey during the prime feeding period in the spring was beneficial for accumulating nutritional stores.

Similar to previous studies (SWG 2016, Laidre et al. 2020, GN unpublished data report MC 2020), the differences in body condition we observed are not likely related to the sampling method. Raw BCS scores were binned into 3 general categories to account for any potential small biases in observer classifications. Furthermore, in other similar studies in which comparisons in BCS were made for an earlier time period that used physical capture to determine BCS and a later time period in which aerial classifications were done, there were no trends of either method for BCS, suggesting that there is not an inherent bias in either method for BCS classification (e.g. Kane Basin: no change in BCS over time, Baffin Bay: decrease in BCS over time, M’Clintock: increase in BCS over time; SWG 2016, Laidre et al. 2020, GN unpublished data). In this study, the observer with the most sampling observations participated in both the early sampling period and recent one. The other observers were experienced and had participated both in physical capture studies and in aerial observation studies. The general application of our body condition index during physical handling has been shown to be a reliable indicator (Stirling et al. 2008). Moreover, there is the potential to assess the lipid content of the extracted adipose tissue from the biopsy darts (Pagano et al. 2014, McKinney et al. 2014) which could be used to verify the aerial condition assessments.

7. MANAGEMENT IMPLICATIONS

The need for continued monitoring

Climate change has affected the sea ice in every polar bear management unit (subpopulation) (Stern and Laidre 2016; Regehr et al. 2016), including GB. Over time, ice concentrations and thickness have declined, and the break-up and freeze-up dates have advanced and delayed, respectively (Stern and Laidre 2016). These changes in sea ice dynamics can elicit behavioural, nutritional, and demographic changes in bears. For example, studies in Baffin Bay documented that bears have reduced their home range size and are spending more time on shore during the ice-free period with reduced denning periods (SWG 2016). In other subpopulations, the effects of climate change on polar bears have been exhibited through reduced body condition, survival rates, and litter sizes (Regehr et al. 2007, Stapleton et al. 2014, Lunn et al. 2016, Dyck et al. 2017, Obbard et al. 2016, 2018). These sea ice changes and their impact on bears have only become apparent because of concerted monitoring efforts of both sea ice and bear movements over long periods of time.

Body condition, reproduction, and survival may reflect changes on a finer temporal scale than abundance and can help understand the mechanisms through which environmental change affects polar bears. The GB subpopulation currently has several knowledge gaps that present challenges for informed decision making. It is currently unknown how bears in GB spend their time during the sea-ice minimum (e.g., July to October) due to the lack of movement data. Also, the delineation of this subpopulation is inferred based on movement of collared female bears during the 1990s (Bethke et al. 1996, Taylor et al. 2001), prior to the large-scale changes in sea-ice habitat. Recoveries of previously captured, and subsequently harvested, bears indicate that there is emigration into LS, MC, and FB (Fig. 7), although whether this is permanent or temporary is difficult to determine without movement data. Note also that our abundance estimate is for the superpopulation (see Discussion section) which likely reflects more animals than occur within the GB management boundary.

In respecting Inuit societal values and concerns over physically handling wildlife, the GN, Department of Environment, did not carry out any collaring to collect radio-telemetry data in GB, despite efforts to garner support for a collaring program and the associated valuable data. The GN, together with other co-management partners, will have to decide on how monitoring polar bears in this subpopulation will continue in order to provide adequate information to decision-makers.

Harvest management and considerations

The GB polar bear subpopulation experienced a mean annual harvest of approximately 62 bears between the harvest years 2004/2005 and 2016/2017 (roughly 40 males and 22 females; GN, unpublished data) with a TAH of 74 bears per year. Our current abundance estimate for the superpopulation, together with other demographic data, suggest that the subpopulation has likely remained stable or only declined slightly given the removal rates and observed climatic sea ice changes. We suggest that taken together this study provides evidence that the GB subpopulation is currently healthy and productive. We documented a potential decline in the male proportion of the subpopulation, which may reflect the harvest system in place (i.e., 2 males for every female). However, similar to the Baffin Bay subpopulation (SWG 2016), we also found evidence for a decline in un-harvested survival for males, which we cannot currently explain. Future research and monitoring should seek to understand the causes and potential ramifications of male survival rates.

Here we provide several considerations to aid in harvest management decisions:

- Conduct a meta-population analysis that includes all possible subpopulations where some exchange of bears occurs (e.g., with LS and MC). This is important because the current abundance estimate for the GB subpopulation of 1525 bears (SE = 294) likely includes bears that also spend time in other management units. Assessing each subpopulation individually could lead to overestimating the total number of bears available and increases the risk of overharvest.

- Determine harvest management objectives (e.g., to maintain, reduce, or increase the subpopulation), taking into account possible changes in environmental carrying capacity in the future and the observed reduction in male proportion and survival rates. Perform a quantitative harvest risk assessment so that scientific information is available to help inform and justify management decisions.

Research recommendations for GB

These recommendations reflect both newly gained insight from the experience of conducting and analyzing the GB data as well as continued awareness of the importance of certain research methods.

1. Seek support from co-management partners to implement a radio-telemetry study to collect movement data in GB to obtain emigration estimates, resolve boundary issues, collect missing demographic data, improve precision and accuracy of demographic estimates, and evaluate changes in habitat use and denning in light of the sea ice changes. Before starting such a study, it would be possible to identify the sample size and duration required to address information needs so that no more bears are physically captured than necessary;

2. a) Sample bears (i.e., introduce more marks into the GB subpopulation) 5 - 7 years post-completion of field portion of last study (e.g., in 2023 or 2024) until the next comprehensive population study will be conducted (~10 – 15 yrs post-completion of last inventory; 2027 - 2032) to increase the number of marked individuals, recaptures and recapture probability of marked individuals. These factors will assist in determining more realistic survival rates when the next comprehensive study is undertaken (note that a power analysis will likely aid in determining whether additional marks really provide more data, and if this endeavor is cost-effective);

   b) Monitor reproductive metrics at the time of mark introduction to assess reproductive performance of GB, and if there are significant changes in reproduction consider whether the timing of the next comprehensive subpopulation assessment should be changed;

3. Or, increase population study length to 4 - 5 years to ensure that it covers a full reproductive cycle and reduces potential biases and assumptions that are required during the modeling process;

8. ACKNOWLEDGEMENTS

We are grateful for the financial and logistical support that was provided for the field component by the Government of Nunavut, Environment and Climate Change Canada, the Nunavut Wildlife Management Board, World Wildlife Fund, Nunavut General Monitoring Program, and the Polar Continental Shelf Program. Additional field assistance was provided by L. Orman, C. Bruneski, C. Smith, J. Aiyout, E. Saittuq, G. Napacheekadlak, F. Anaittuq, L.Tigvareark, R. Quqqiaq, B. Ekelik, P. Qagutaq, L. Uqqarluk, M. Taylor, G. Szor, and M. Anderson. We thank our pilots S. Lodge, S. Sande, and G. Hartery for their expert flying skills. Following consultation meetings in 2014, the project received support from the Kurairojuark Hunters and Trappers Association [HTA] (Kugaaruk), Spence Bay HTA (Taloyoak), Arviq HTA (Naujaat), and the Igloolik, Hall Beach, and Gjoa Haven HTAs. This research was conducted under Nunavut Wildlife Research Permits (WL 2015-002, WL 2017-001), Northwest Territories Animal Care Committee Approvals (2015-006, 2016-004, 2017-001), land use permits from the Kitikmeot Inuit Association (KTX116X001) and Qikiqtani Inuit Association (Land Use Permit Q14X023, Q16X002). We thank N. Hostetter for reviewing this report critically and for providing constructive feedback. E. Richardson and D. McGeachy provided additional sea ice information for body condition calculations.

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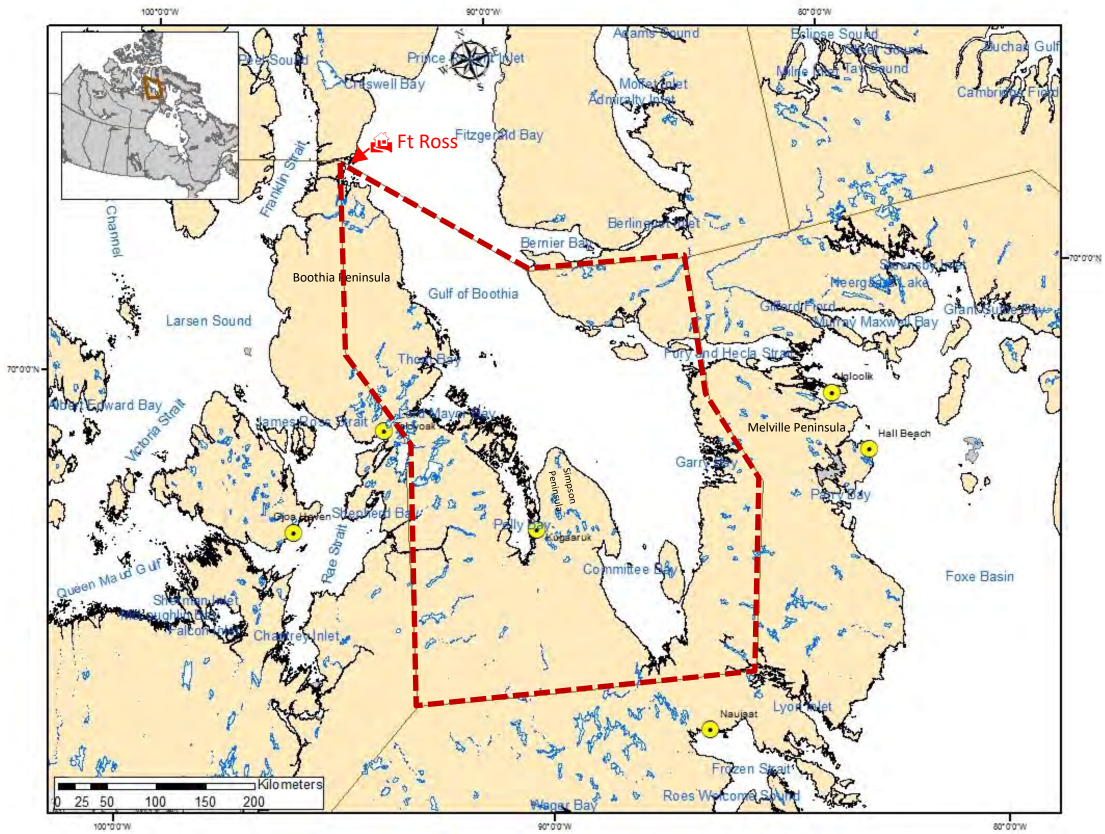

Figure 1. Basic overview and location of the Gulf of Boothia polar bear subpopulation delineated by red dashed line.

a)

b)

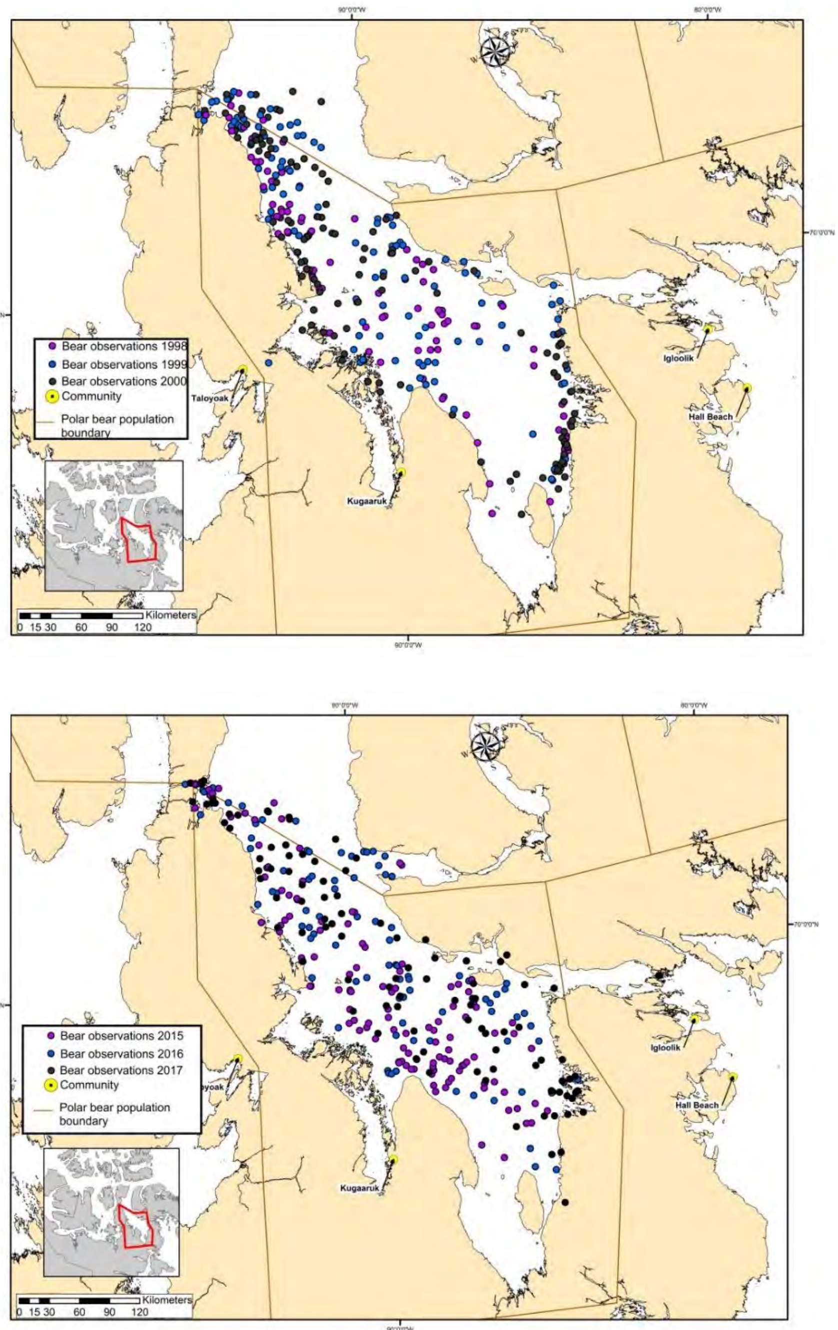

Figure 2. Locations of observed polar bears within the Gulf of Boothia study area during the 1998 - 2000 (a) and 2015 - 2017 (b) studies. Different colored dots indicate different years. Inset shows subpopulation boundary in red.

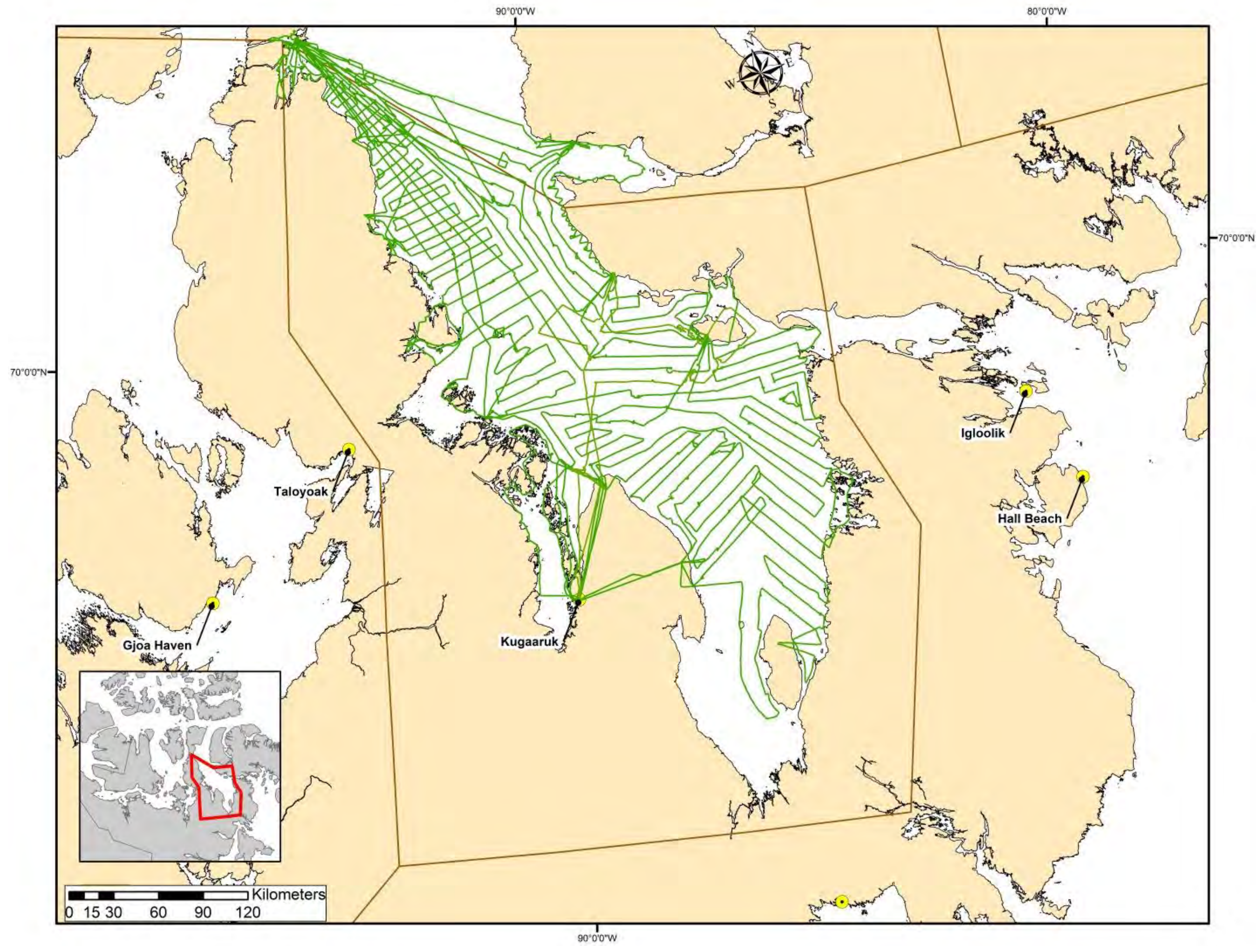

Figure 3. Flight tracks (green lines) of helicopter flown in search for polar bears in Gulf of Boothia, Nunavut, Canada, during April/May 2017. Inset shows subpopulation boundary in red.

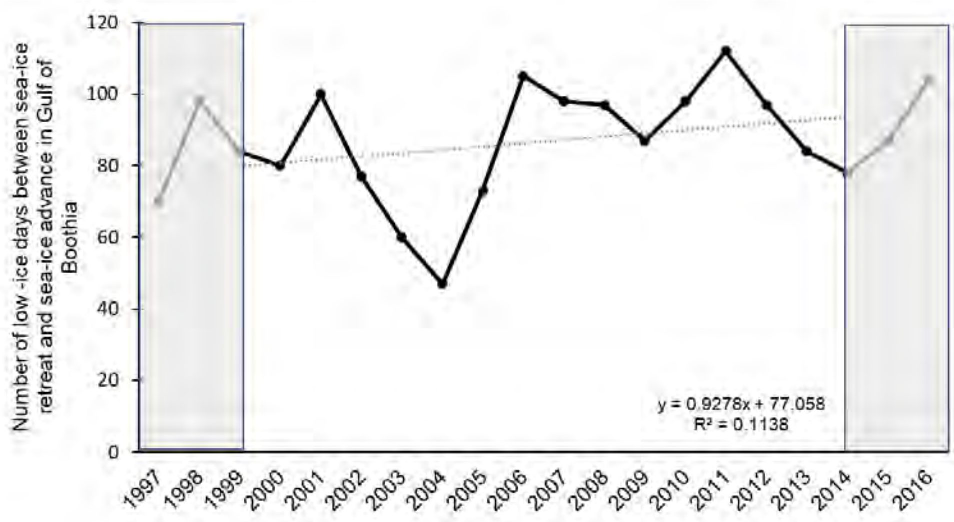

Figure 4. *Sea-ice metric of 'low-ice days' calculated as the number of days between the sea ice retreat and sea ice advance in calendar year* t *using the transition dates when ice concentration dropped below, and exceeded, respectively, the midway point of sea ice concentration between the March and September mean (Environment and Climate Change Canada 2018). Shaded boxes indicate sampling periods used in this study and intervening years are shown for context. Gray dotted line indicates the linear trend of low-ice days from 1997-2016.*

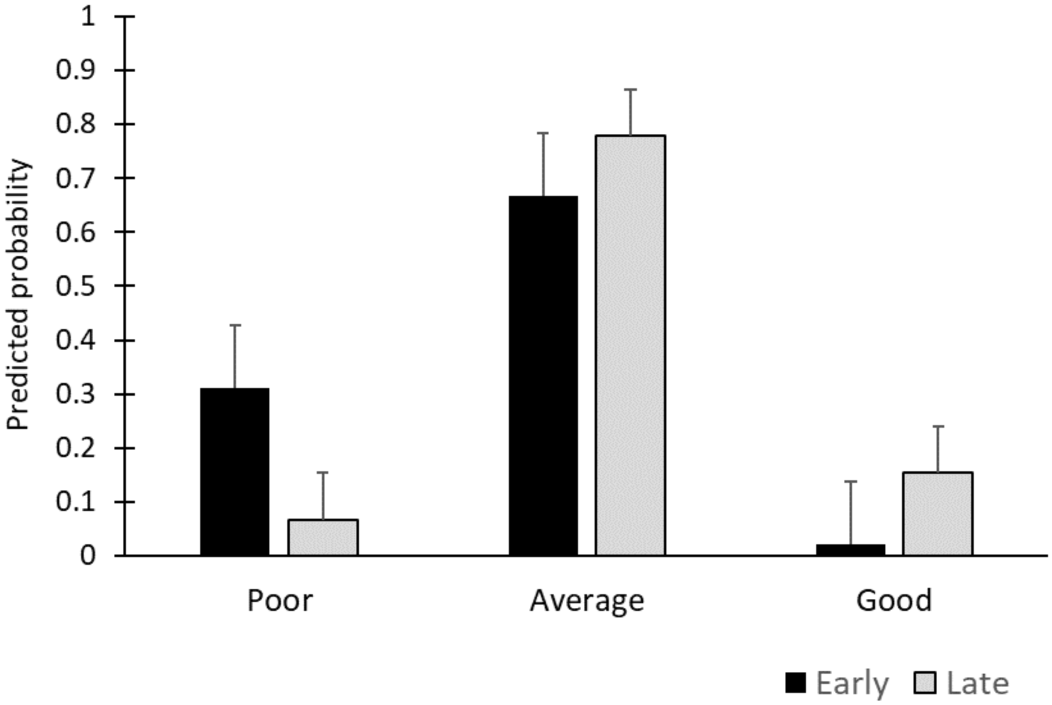

Figure 5. Predicted probability based on best-fit model parameter estimates of a bear being classified as poor, average, or good body condition for each time period (Early = 1998 - 2000; Late = 2015 - 2017).

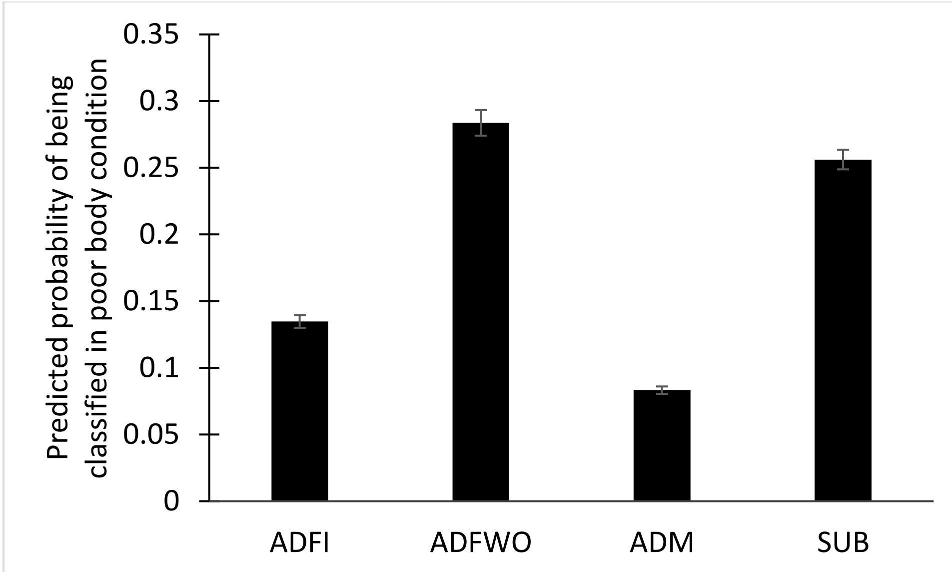

Figure 6. Predicted probability based on best-fit model parameter estimates of a bear being classified in poor body condition for each reproductive age class across both time periods. Adult females with offspring and subadults were more likely than other reproductive age classes to be classified in poor body condition at the time of sampling (ADFI = independent adult female, ADFWO = adult female with offspring, ADM = adult male, SUB = subadults of both genders).

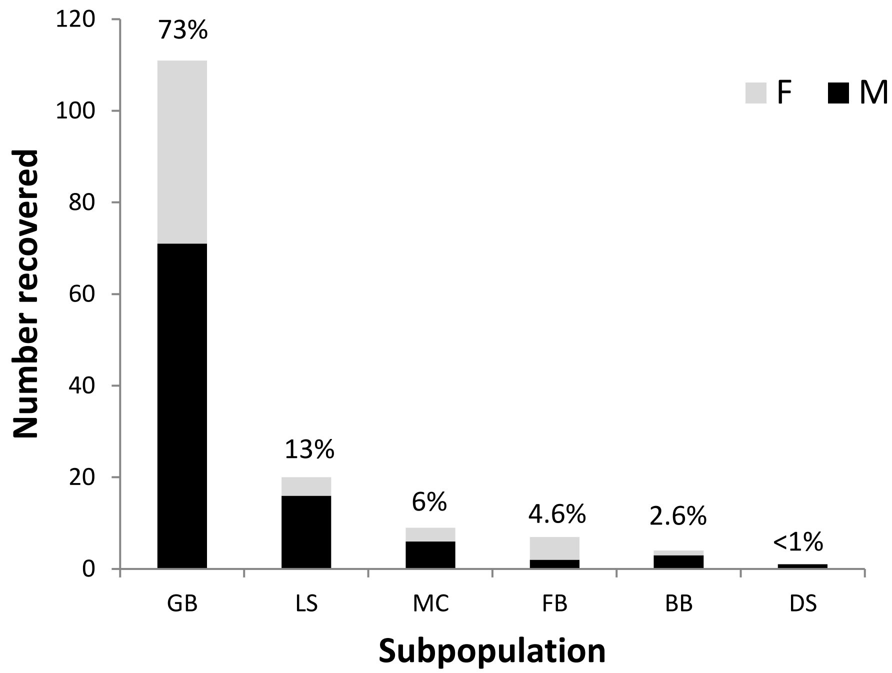

Figure 7. *Number of polar bear tags that were initially deployed within the Gulf of Boothia subpopulation boundary and subsequently recovered through the harvest between 1972 and 2017. Percentages indicate the proportion of total recoveries that occurred in a given subpopulation (GB=Gulf of Boothia; LS = Lancaster Sound; MC=M'Clintock Channel; FB=Foxe Basin; BB=Baffin Bay; DS=Davis Strait).*

Table 1. Parameter estimates for best-fit ordinal logistic regression model (reference level = “poor”/BCS = 1) for body condition score analysis of the Gulf of Boothia subpopulation.

Parameter	Estimate	SE	*p*
periodlate	3.77	1.61	0.02
reproclassADFWO	-5.70	3.12	0.07
reproclassADM	3.74	3.03	0.22
reproclassSUB	2.07	3.22	0.52
jul_cap_day	0.03	0.02	0.14
periodearly:icetm	0.04	0.01	0.001
periodlate:icetm	-0.02	0.01	0.08
reproclassADFWO:jul_cap_day	0.04	0.03	0.14
reproclassADM:jul_cap_day	-0.03	0.02	0.29
reproclassSUM:jul_cap_day	-0.02	0.03	0.35

Table 2. Parameter-specific submodels used to analyze live-recapture dead-recovery data for the Gulf of Boothia polar bear subpopulation.

Submodel name	Submodel structure
S1	.
S2	year
S3	icetm1
S4	sex
S5	sub
S6	year + sex
S7	year + sex + year:sex
S8	year + sub
S9	year + sub + year:sub
S10	icetm1 + sub
S11	icetm1 + sub + icetm1:sub
S12	sex + sub
S13	year + sex + sub
S14	year + sex + sub + year:sex + year:sub
S15	icetm1 + sex + sub
S16	icetm1 + sex + sub + icetm1:sex + icetm1:sub
r1	.
r2	year
r3	sex
r4	year + sex
r5	year + sex + year:sex
p1	.
p2	year
p3	sex
p4	year + sex
F1	.
F2	year
F3	sex
F4	year + sex

(*S* = survival; *r* = dead reporting probability; *p* = recapture probability; *F* = fidelity)

Table 3. Overview of descriptive field statistics of the Gulf of Boothia polar bear study 2015 - 2017.

Field Year	Search time (hr)	Number of bears/hr	Bears encountered[a]	Flown distance (km)	Duration
2015	96.0	1.90	185	11,737	29 April - 26 May
2016	99.3	1.62	161	12,867	20 April - 14 May
2017	115.0	1.40	162	12,200	26 April - 15 May

[a] The number of bears encountered does not represent the genetically corrected number of bears (e.g., some bears have been re-sampled within same sampling period)

Table 4. Body condition scores (BCS) for polar bears in the Gulf of Boothia subpopulation 1998 - 2000 and 2015 - 2017. Poor BCS corresponds to a thin bear and Good BCS corresponds to a fat/obese bear. Age classes are adult (≥ 5 years) and subadult (2 - 4 years).

	Body condition scores					
	1998 - 2000			2015 - 2017		
	Poor	Average	Good	Poor	Average	Good
Adult female without offspring	17	28	3	2	60	19
Adult female with offspring	30	40	2	5	86	4
Adult male	19	104	4	1	64	28
Subadult	25	34	2	4	43	2
Total	91	206	11	12	253	53

Table 5. Numbers and mean sizes of cub-of-the-year (C0) and yearling (C1) litters observed during capture-recapture studies on the Gulf of Boothia polar bear subpopulation.

	1998	1999	2000	2015	2016	2017
Number of C0 litters	20	13	20	12	22	12
Mean C0 litter size	1.60	1.54	1.70	1.75	1.50	1.58
Number of C1 litters	13	17	10	18	9	13
Mean C1 litter size	1.31	1.53	1.80	1.56	1.44	1.62

Table 6. Model-averaged parameter estimates for a binomial logistic regression on cub-of-the-year (C0) litter size for the Gulf of Boothia polar bear subpopulation.

Parameter	Estimate	SE	P	Importance
(Intercept)	0.78	1.12	0.49	NA
icefree.tm1	0.00	0.01	0.75	0.31
periodearly	0.02	0.19	0.90	0.18
month05	-0.01	0.18	0.98	0.17
BCS (level 1)	-0.07	0.27	0.79	0.15
BCS (level 3)	0.11	0.43	0.80	0.15

Table 7. Model-averaged parameter estimates for a binomial logistic regression on yearling (C1) litter size for the Gulf of Boothia polar bear subpopulation.

Parameter	Estimate	SE	P	Importance
(Intercept)	-0.74	1.53	0.63	NA
icefree.tm1	0.01	0.02	0.57	0.41
periodearly	-0.05	0.24	0.86	0.26
BCS (level 1)	0.02	0.13	0.91	0.06
BCS (level 3)	0.00	0.25	1.00	0.06

Table 8. Numbers of live-observations and dead-recoveries (in parentheses) of individually identified polar bears in the Gulf of Boothia subpopulation used in survival estimation.

Years	AFNC[a]	AFC0[b]	AFC1[c]	AM[d]	C1[e]	SF[f]	SM[g]
1976 - 1997	21 (18)	17 (0)	10 (0)	49 (23)	15 (0)	13 (4)	21 (0)
1998 - 2000	75 (3)	53 (0)	40 (0)	128 (6)	68 (0)	49 (3)	44 (5)
2001 - 2017	88 (5)	46 (0)	40 (0)	94 (19)	61 (0)	21 (1)	34 (5)

([a]AFNC = adult female no cubs; [b]AFC0 = adult females with cubs-of-the-year; [c]AFC1 = adult females with yearlings; [d]AM = adult male; [e]C1 = yearlings; [f]SF = subadult females; [g]SM = subadult males)

Table 9. Importance scores for the various factors and covariates within the parameter-specific survival submodels. Importance scores for interaction terms (e.g., year:sex) should be interpreted with caution because interactions can only appear in models with the corresponding main effects.

Factor or covariate	S	r	p	F
sex	0.82	0.33	0	0
year	0.71	0.35	0.06	0.16
year:sex	0.67	0.33	NA	NA
sub	0.23	NA	NA	NA
year:sub	0.23	NA	NA	NA
icetm1	0.05	NA	NA	NA
icetm1:sex	0	NA	NA	NA
icetm1:sub	0	NA	NA	NA

Table 10. Model-averaged parameter estimates for the Burnham model for survival and abundance.

Parameter	Class	Year block	Estimate	lci	uci
*S**	Adult female	1976-2004	0.94	0.90	0.98
*S**	Adult male	1976-2004	0.93	0.90	0.95
*S**	Subadult female	1976-2004	0.93	0.86	0.99
*S**	Subadult male	1976-2004	0.91	0.85	0.96
*S**	Adult female	2005-2017	0.97	0.91	1.00
*S**	Adult male	2005-2017	0.90	0.83	0.96
*S**	Subadult female	2005-2017	0.95	0.86	1.00
*S**	Subadult male	2005-2017	0.87	0.75	0.99
S	Adult female	1976-2004	0.92	0.86	0.96
S	Adult male	1976-2004	0.89	0.85	0.93
S	Subadult female	1976-2004	0.90	0.80	0.95
S	Subadult male	1976-2004	0.87	0.77	0.92
S	Adult female	2005-2017	0.95	0.81	0.99
S	Adult male	2005-2017	0.85	0.74	0.92
S	Subadult female	2005-2017	0.94	0.69	0.99
S	Subadult male	2005-2017	0.81	0.59	0.92
r	All female	1976-2004	0.26	0.17	0.38
r	All male	1976-2004	0.29	0.22	0.37
r	All female	2005-2017	0.22	0.08	0.46
r	All male	2005-2017	0.33	0.21	0.47
p	All female	1976-2004	0.11	0.08	0.15
p	All male	1976-2004	0.12	0.08	0.16
p	All female	2005-2017	0.10	0.07	0.14
p	All male	2005-2017	0.10	0.07	0.15
F	All female	1976-2004	0.95	0.71	0.99
F	All male	1976-2004	0.99	0.38	1.00
F	All female	2005-2017	0.93	0.79	0.98
F	All male	2005-2017	0.95	0.59	1.00

(S* = unharvested survival; S = total survival; r = dead reporting probability; p = recapture probability; F = fidelity)