

Exposure and stress. Motoring over and past spawning grounds and concentrated fishing pressure at "fishing holes" causes stress.

Long staging times averaging 33 days (up to 67)⁴⁹⁻⁵⁰ in the Kenai River mainstem adds exposure to Kenai River mainstem and tributary-spawning Kings.

From 2008-2010, the Kenai Watershed Forum recorded at peak more than 700 outboard motor boats running the Kenai River below Skilak Lake simultaneously.⁵¹

EAST SIDE SETNET EFFECT

Early-run. The Kenai-East Forelands section (Kenai River area and north) of Eastside Setnetters has not fished the early-run at all in 30 years (1985).⁵² Their season doesn't start until July 8 at the earliest.⁵³

On years when Kasilof sockeye are running abundantly and early, the Kasilof section of the Eastside Setnet area sometimes will have fishing opportunity during last ten days of June.⁵⁴ ADF&G describes their catch of returning early-run Kings as "insignificant".⁵⁵

Genetic stock identification of Kenai tributary-bound Kings harvested by all Eastside Setnetters combined averaged .004 over the entire 2010-2013 seasons.⁵⁶

Eastside Setnetters objectively are neither the cause or nor a contributing factor to the decline of the early-run King fishery.

On any year, the only significant harvests of the early-run Kenai Kings are by in-river sportfishmen.

Late-run. In 2013, all of the East Side Setnetters' late-run King harvest contributed .5% (1/2 percent) to the value of their sockeye salmon fishing harvest.⁵⁷

Of the total King harvest by Eastside Setnet fishermen, 31.3% were bound for river systems other than the Kenai River according to a four-year genetic stock identification study.⁵⁸⁻⁵⁹

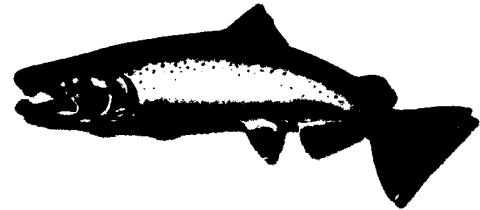
According to an ADF&G genetic stock identification study, in 2013, Eastside Setnetters' catch of late-run Kenai Kings 5-years-old and older (large enough to be counted by the Didson counter in-river⁶⁰) was 3.5% of the total run.⁶¹

The Eastside Setnetter's catch of jack 3- and 4-year-old Kings was 6.9% of the total late-run.⁶²

The sportfish daily limit on jack Kings less than 20 inches long (3 year-olds) is 10 per day.⁶³

Adding 3.5% + 6.9%, Eastside Setnetters caught 10.4% of the run Kenai Kings in 2013.

**KING SALMON IN THE KENAI
Numbers to Consider**



LATE RUN KINGS	1987	2013
In-river run strength	63,550 ¹	17,015 ²
Average size	34 lb ³	15 lbs ⁴
Escapement	50,327 ⁵	15,395 ⁶
Jacks: (3 & 4 yr-olds)	9% ⁷	66% ⁸
Males % of total run	49% ⁹	88% ^{* 10}

* Setnet index

Late-run Kings arrive to the Kenai River after June 30.¹¹

There were 471,274 angler days fished in the Kenai and Russian Rivers in 2013.¹² The Kenai River downstream of the Soldotna Bridge (river mile 21) is the most heavily fished part of the Kenai River by an order of magnitude.¹³

More late-run Kings spawn below the Soldotna Bridge than in any other section.¹⁴

EARLY RUN KINGS	1987	2013
In-river run strength	25,643 ¹⁵	2,038 ¹⁶
Escapement	12,362 ¹⁷	2,033 ^{* 18}

*Did not make the minimum optimum escapement goal of 5,300.¹⁹

ADF&G early run Kenai Kings are counted from May 15 to June 30.²⁰

On average mainstem and tributary spawners mill in-river for 33 days, with a range up to 67 days.^{21, 22}

The Bendock catch-and-release mortality study estimated 70% of early-run Kings were available to in-river, sportfish harvest in July.²³

A 2010-2013 tagging study showed that as late as July 31, more than 30% of tagged fish detected in open-to-fishing waters above Slikok Creek on the Kenai River were early-run, mainstem spawners.²⁴

Over 90% of the early-run King return to the Kenai River was caught by sportfishermen in 1988. 5,946 (73% of escapement) of those were caught-and-released.²⁵

PRODUCTIVITY

Each run is composed of Kings of mixed parent (brood) years from 2 to 8 years earlier.

Jacks may be defined as young, sexually mature 3 or 4 year-old males that return to spawn earlier than the females of their brood year.²⁶ In a 1984 study, 4-year-old early-run Kenai Kings were 27 inches in length and smaller, averaging 22 inches in total length.²⁷

Kings have narrow-sense (strongly inherited) heredity traits including 1) age-at-maturity and 2) size-at-age.²⁸

Older, larger female Kings are more productive and may produce more than 4 times more eggs than smaller, younger Kings,^{29,30} e.g., 4,200 versus 17,200 eggs.²⁹

In 1988, ADF&G estimated an early-run return of 57 8 year-old Kenai Kings, 2,279 7 year-olds, and 15,077 6 year-olds.³¹

The nest of a large female King may be as deep as 2.5 feet and larger than 150 square feet.³²

Because age-at-maturity is strongly inherited, in general, young jacks return more jacks.³³ Larger, older Kings at maturity beget larger, older Kings at maturity.^{34,35}

Changing fish population structure to younger, smaller fish can lead to decreased reproductive potential, lower reproductive rates, loss of yield, increased variability in abundance, and fishery collapse.³⁶

The energy budget required for metabolic changes necessary for living in fresh water, migration, and spawning for Kings is visibly observable in changes in color and teeth during this phase.

CONTRIBUTING CAUSES OF DECLINE

Overfishing and targeting the largest, most productive trophy Kings. Targeting large Kings is a key to "fisheries induced genetic selection" for younger, smaller, less productive returns.³⁷

ADF&G Sportfish Division continues to sponsor a trophy (more than 55 inches total length), catch-and-keep King fishing contest³⁸ even when other conservation measures are being taken, e.g., July 2013.³⁹

ADF&G Sportfish Division endorses a "slot limit hook-and-release policy" (42-55 inches) that invites more hook-and-release mortality even on years like 2013 when early-run minimum thresholds had not been reached.^{38,39}

The slot limit policy combined with the trophy fishing contest encourages hook-and-keep retention of all the Kenai River's largest, most productive Kings (more than 55 inches long).

Hook-and-release 5-day mortality. In 1989, ADF&G estimated average **5-day** mortality for once-caught-and-released Kings at 10.6%.⁴⁰

Although an average of 10.6% of the hooked-and-released Kings died within 5 days in the 1989 study, only 40% of Kings caught, tagged, and released actually spawned.⁴¹

Over three years of continued study, the 1989-91 average early-run caught-and-release 5-day mortality was measured at 7.6%.⁴²

ADF&G currently assumes a 6.4% catch-and release mortality rate, averaging only the 1990-91 studies.⁴³

Out-migration. In 1989, in addition to 10.6% 5-day mortality, another 16% out-migrated the Kenai River after catch-and-release, returning to the ocean where they were caught or otherwise disappeared.⁴⁴

A late-run 2010 tagging study resulted in 18% "drop-outs" Kings that out-migrated the Kenai River after handling.⁴⁵

Effective hook-and-release mortality. Adding out-migration following catch-and-release to 5-day mortality amounts to a 1989 "effective mortality" of only once-caught-and-released Kings of up to 27%.

Add twice-hooked-and-released mortality to "effective mortality." In the 1989 study, 57% of Kings twice-caught-and-released did not survive to spawn.⁴⁶

According to ADF&G, in the related 1990 tagging study, Kings twice-caught-and-released had half the survival rate and three times the river exodus, out-migration rate.⁴⁷

Disproportionate fishing pressure. In 2013, ADF&G observed that because the Kenai River downstream of the Soldotna Bridge is the most heavily utilized mainstem spawning area in both historical and recent ADF&G data, closures upstream of Slikok Creek have not conserved mainstem spawning Kings in proportion to abundance.⁴⁸