Mandate — The Commission's mandate (RCW 77.04.012) should be cited in the GMP introduction. The hunting comments we get, whether pro or con, often cite our mandate and the public rightly expects our actions to be consistent with it. Among other things, the mandate highlights our responsibility to "preserve, protect, perpetuate, and manage.…"

Overarching considerations — Commissioner Smith's list of broad topics should be incorporated into the GMP's opening chapters. They provide important context for hunting activities generally and they warrant more immediate attention and discussion by the full commission.

Principles — A more rigorous list of principles is needed to address the hunting effects on wildlife populations. The current principles are incomplete, ill-defined, and heavily weighted toward hunter opportunity.

a) Principles (1 through 18, and 21) pertain to hunter opportunity, principles 10, 15, and 16 reference the "resource" and 19 and 20 mention the climate change and ecosystem effects of hunting;

b) The GMP should describe what is meant by the statements "protect the resource" (principle 10), "consider high standards of hunter ethics and principles of fair chase" (principle 18), "consider the effects of climate change" (principle 19), or "consider the effects to ecosystem health" (principle 20).

c) Additional principles are needed regarding the amount of hunting mortality acceptable, when and where potentially hunted populations may warrant protection, under what conditions different age/sex classes may be taken, how much waste is acceptable, when and how to report (and what to do about) animals injured but not recovered, the consequences of failing to submit required kill reports and samples, how to take into account other forms of human-related (e.g., vehicle collision, poaching) and natural (e.g., disease) mortality, and what types of information should be collected for research and management purposes.

Ecosystem-based management — The GMP should define and describe what it means by "ecosystem-based management" for all hunted species. The best way to do that is to include all the relevant ecological information on hunted species (e.g., food, preferred or required habitat conditions, vulnerability to predators, disease, fire, drought, climate change, all sources of human-related mortality and disturbance). Examples of ecosystem-based or ecologically-driven management measures include closing a fishery because river flows are inadequate for fish passage, studying predator-prey relationships, restoring estuarine habitat, clearing manmade materials that block fish passage, limiting shoreline construction, promoting recovery of burned habitat, creating the Washington's State Wildlife Action Plan to protect large biological communities.

Issues — The issues the committee previously identified warrant full, specific description, including —

1) goals, objectives, and strategies and science needed to assess them;

2) means for fostering broad public involvement (including non-hunters) and balancing their viewpoints;

3) the concept of fair chase in terms of weapons, technology, and methods allowed;

4) monitoring of hunting behavior and compliance with rules and regulations;

5) full effects of toxic ammunition, costs of replacing it, and justification for not doing so; and

6) hunter seasons and the implications for non-hunter use/activities of areas otherwise hunted.

Integration with other department activities — The GMP should integrate descriptions of status, trends, ecology, etc., with the information on game management to provide a comprehensive description of each hunted species in one place. Separating hunting from other management activities promotes a piecemeal, siloed approach that may elevate hunting over other priorities, including conservation.

Scientific objectives/standards — The Commission and Department need comprehensive, regular, and reliable information to make well-informed management decisions for hunted populations, including—

- *Population structure* — Conservation biology generally begins by identifying biologically meaningful populations. They can be identified based on morphology, geography, demography, and/or behavior, but genetics are now the primary tool for characterizing population structure. The recent study identifying three distinct cougar populations in Washington State illustrates the power and value of genetic methods and provides a more biologically sound basis for cougar management. Other population metrics (e.g., distribution, abundance) are compromised if our identification of population structure is faulty.

- *Distribution* — A population's distribution and movement patterns provide insight into its requirements for food and shelter from harsh physical conditions and predators, as well as the risks to which it is or may be

exposed, including those from human activities. For example, knowledge of Blue Mountain elk distribution and movement patterns is critical to evaluating threats to those herds, including hunting, disturbance, predators, availability of adequate forage, disease, and response to fires and fire-scorched habitat.

- *Abundance* — Abundance is the most frequently studied, easily understood, and commonly used metric of managed populations. Over the past four decades scientists have increasingly coupled abundance with other parameters to conduct more robust and informative population assessments. Population viability analyses, for example, are attempts to use all the available information for a population to produce the most rigorous and reliable assessment of its viability (the probability that it will persist over a period of time).
- *Trend* — Trends describe changes in a population parameter relative to a second factor such as time or space. They are most commonly used in conservation science to indicate whether a population's status is improving, stable, or declining. Steller sea lions numbered about 45,000 in 1990 when the population was listed under the ESA because its trend revealed an ~80% decline over the two previous decades.
- *Population growth rate* — Under density dependence theory, K-selected populations[1] are expected to grow at their maximum rates when they are small, with the growth rate slowing as they approach environmental carrying capacity. These species can decline rapidly, but only recover slowly. A populations growth rate determines its tolerance for human-caused mortality, including but not limited to, hunting. Washington's cougar populations grow at about 14% per year, which should be considered in setting cougar hunting limits.
- *Vital rates* — A population's vital rates (survival and reproduction for "closed" populations plus emigration and immigration for "open" populations), coupled with its sex/age structure, determine a population's growth rate and often vary in response to risk factors. Vital rates are best evaluated together to get a full picture of a population's demographics. For example, a high birth rate in the southern resident killer whale population is desirable but of little consequence if offspring survival is poor. Male survival is necessary to ensure a population's genetic variability; female survival is critical for determining a population's reproductive capacity.
- *Age/sex structure* — A population's age/sex structure reflects its vital rates and provides insight into its status. Age/sex structure can be contorted by various risk factors, changes naturally with population growth, and tends to be more variable in small populations. The age/sex structure of the southern resident killer whale population indicates that its reproductive capacity will decline in the coming decade as mature females either die or age out of the reproductive class and are not replaced by an equal number by young, maturing females.
- *Ecology* — Ecological relationships are among the more recent additions to population assessment. Including them in science, management, and policy functionally expands our ability to conserve ecosystems and biodiversity. The transition required is analogous to shifting from a simple regression model to a multiple regression model — more complex, but also more informative. The incorporation of ecological information is key for evaluating a wide range of issues such as competition between fisheries and pinnipeds, eulachon fishery effects on salmon and orca recovery efforts, and deer and elk response to carnivores.
- *Risk factor*s — Elucidation and analysis of all risk factors is key to population assessment, as revealed by the growing use of population viability analysis. Such analyses are generally considered the best available scientific method for assessing the combined effects of multiple human and non-human risk factors on the subject population. They are part and parcel of an ecosystem-based approach to assessment and management.
- *Tolerance for human-related adverse effects* — Assessing the health of a wildlife population requires a determination of how much human-related mortality the population can withstand. The Marine Mammal Protection Act sets specific requirements for stock assessments and it determines a marine mammal "stock" (or "population stock") to be depleted if it "is below the optimum carrying capacity for the species or stock within its environment." The Act defines the "optimum sustainable population" to mean,
    - "with respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the optimum carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element."
- The National Marine Fisheries Service and Fish and Wildlife Service subsequently defined the optimum sustainable population to be a range from the stock's maximum net productivity level to its environmental carrying capacity.

---

[1] Under density-dependence theory, these are populations that tend to fluctuate around their environmental carrying capacity, are relatively slow growing, produce relatively few offspring, and invest more in care of those offspring.